THE Journal

AUGUST

1958

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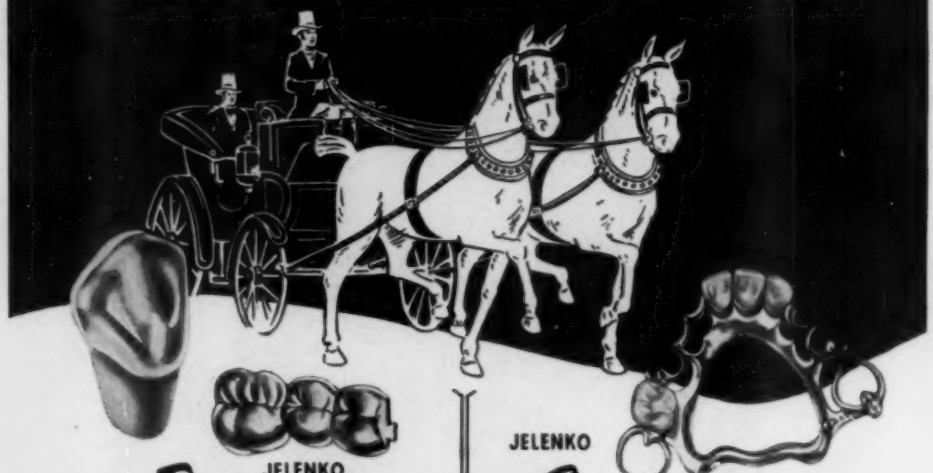

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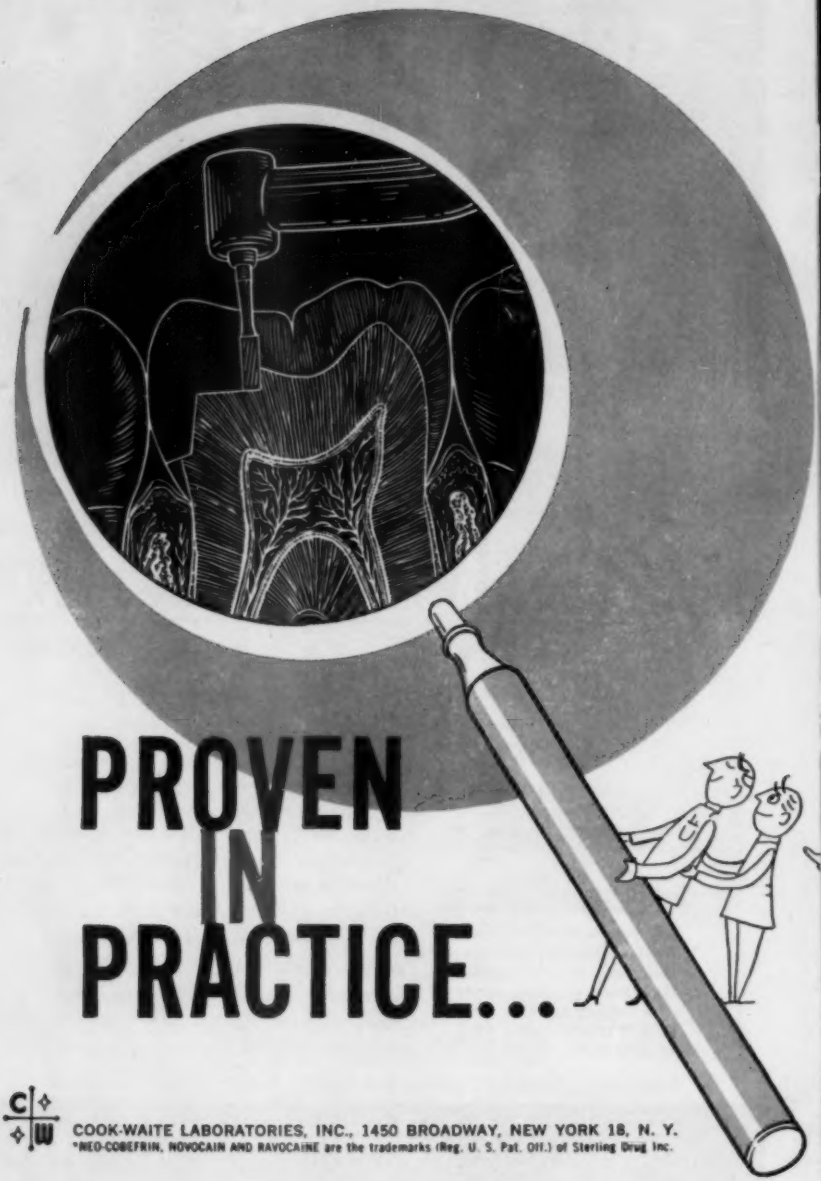

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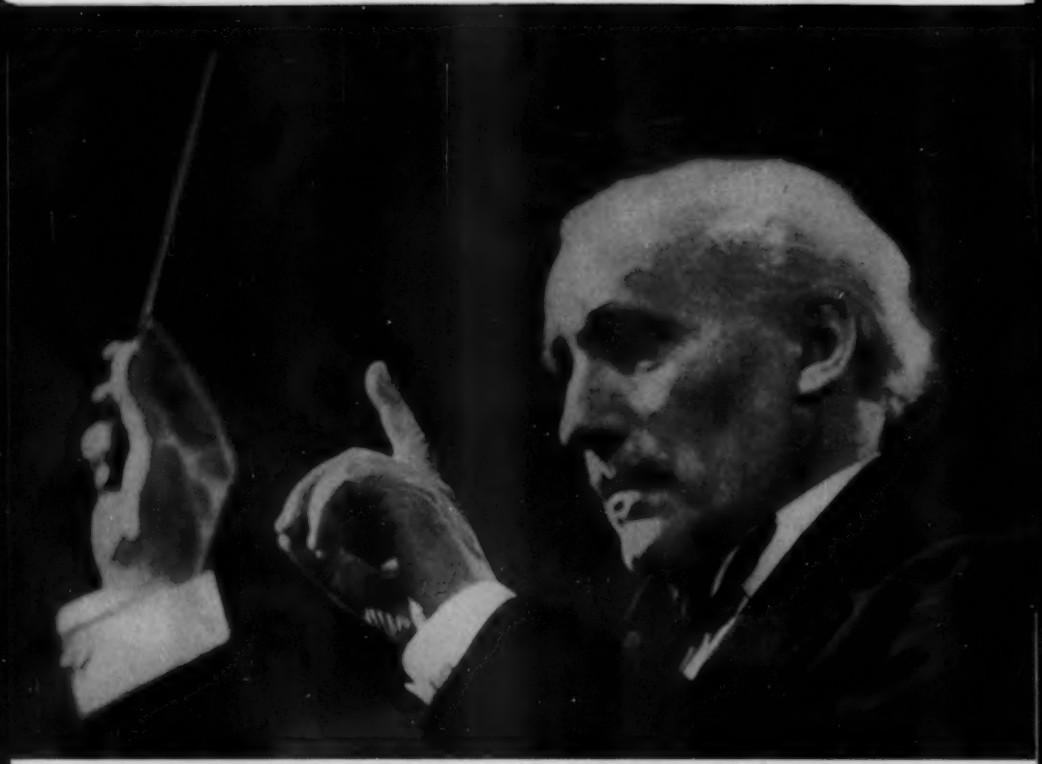

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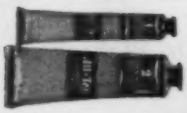

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[Council on Dental Health: J. Am. Dent. A. 47:387 (Oct.) 1953.]

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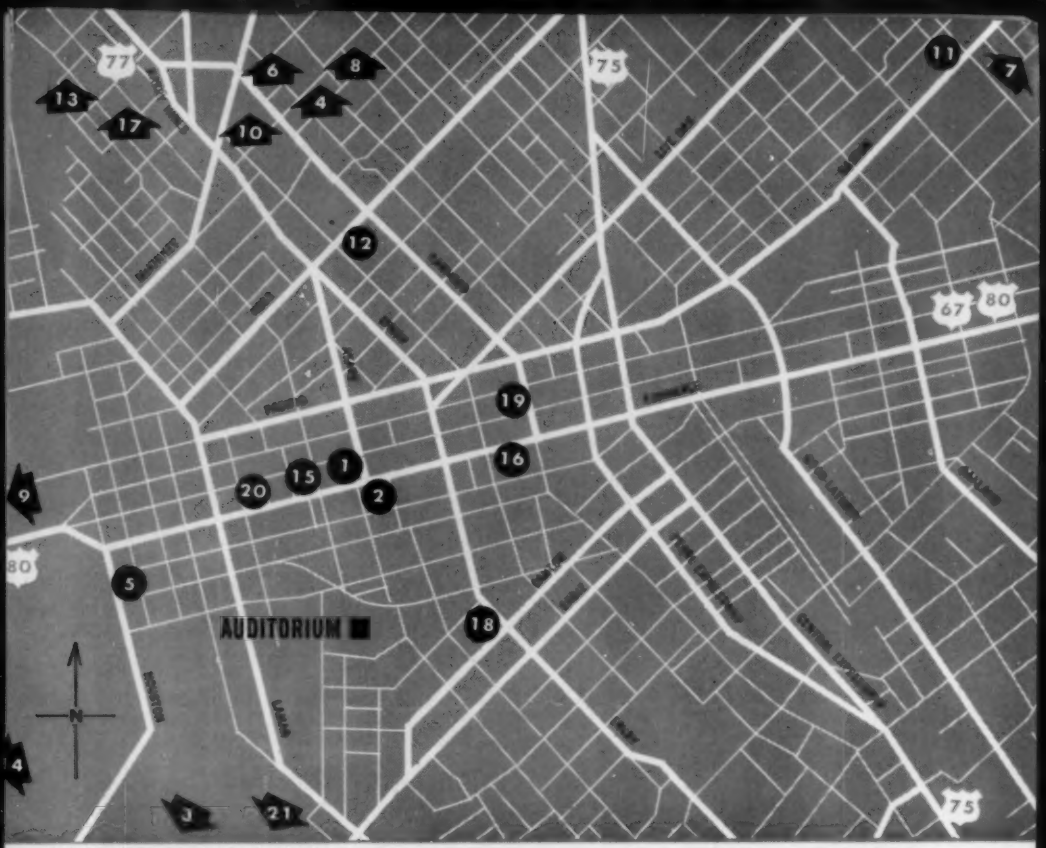

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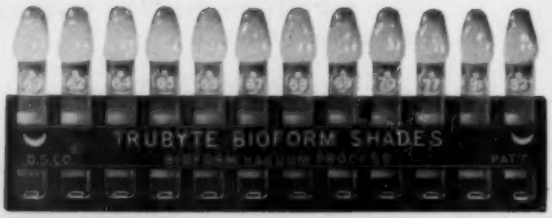

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AUGUST 1958

THE Journal OF THE AMERICAN DENTAL ASSOCIATION

VOLUME 57 • NUMBER 2

Problems in prosthodontics: introduction

Charles H. Jamieson, D.D.S., Detroit

The science and art of prosthetics has advanced greatly since the days of Bonwill and the Greene brothers. The inadequacies of diagnosis and treatment for the edentulous patient of that time were recognized by the thinking men who followed. They remain anonymous here only because mention of a few would neglect others who have contributed much toward the present high standards of service.

The evolution of this phase of dentistry has been characterized by an increased recognition of the importance of physiological and functional dentures as they affect the well-being of the total man. Research in both the theoretical and practical aspects of this subject is advancing on all fronts—in the individual laboratory, in the dental schools, and in associated industries, with the encouragement and support of the American Dental Association and its affiliates.

The fact that there is no general agreement on the methods by which perfect dentures can be made merely emphasizes the need for continued study of the problems which are involved. Every dentist encounters these problems in the routine of practice, and they are as variable as the physical and mental characteristics of the patients who seek his services. Dentists must meet these problems with present knowledge, achieving a degree of success in proportion to their ability and understanding of the various methods currently in use. Differences of viewpoint stimulate the search for a better way. Uniformity and satisfaction with present conditions stifle progress.

Sir William Haley, editor of the *London Times*, described Americans as a "people rather baffled but a people resolved to know." I do not agree that we are baffled, but as dentists working for the betterment of the dental health of all people, we are indeed resolved to know.

One day it will be known why excessive ridge resorption may occur in but one of two individuals who exhibit similar physical characteristics and even similar bone patterns. One day the dentist will be able to restore masticating efficiency and oral

comfort to those unfortunate patients whose rehabilitation now defies his efforts. This is not too much to hope for. The continuing effort of dentistry with the help of inquiring minds in associated sciences eventually will solve many problems which delay progress.

To provide JOURNAL readers with the latest information on prosthodontics, this issue presents 12 papers on various aspects of the subject. Five of these papers were presented at the ninety-eighth annual session of the Association. They are supplemented by seven equally valuable articles by equally qualified authors. Since many books have been written on prosthodontics, it is obvious that all cannot be told in 12 articles, but the titles selected to be included are those which, because of their general interest, are often in the spotlight.

563 David Whitney Building

Impressions

Harold L. Harris, D.D.S., Denver

Many articles on the subject of impressions of the edentulous ridges have appeared in the literature in the past few years. So much of this material is repetitious, that another paper, unless it presented some new principle or method, would seem superfluous. Yet there is value in repetition, for it re-emphasizes the basic principles and requirements of satisfactory impressions.

Unanimity of acceptance of any one impression material or any one technic is neither necessary nor desirable, for once reached, progress would stop. Progress is made by thinking men who accept basic facts and fundamentals, yet believe there must be a better way or method to achieve the final result.

Recognized leaders in the field of prosthodontics have emphasized the fundamentals again and again. Boucher[1] has summed up the requirements of any sound impression technic by stating that the resulting impression must exhibit (1) retention, (2) stability, (3) support, (4) esthetic consideration and planning and (5) preservation of the underlying residual ridges.

Fisher[2] has emphasized the following six basic requirements: (1) roentgenographic, visual and digital examination of the oral cavity, (2) surgical removal of such abnormal formations as would prevent successful completion of impressions, (3) the required extension outlines, (4) the location and provision for areas of variable tissue displaceability, (5) the required retention outline and (6) the required adaptation.

Tilton,[3] in an excellent article on technic, has pointed out the meaning and

Presented as part of a "Forum on Complete Denture Construction," ninety-eighth annual session, American Dental Association, Miami, Fla., November 6, 1957.

1. Boucher, C. O. Complete denture impressions based upon the anatomy of the mouth. J.A.D.A. 31:1174 Sept. 1944.

2. Fisher, R. D. Six fundamental rules for making full denture impressions. J. Pros. Den. 1:135 Jan.-March 1951.

3. Tilton, G. E. Minimum pressure complete denture impression technique. J. Pros. Den. 6:6 Jan. 1956.

result of nonpressure, minimum pressure and selective pressure impression methods.

The following desirable attributes of finished denture bases have also had wide acceptance:

1. There must be maximum coverage of the basal seating area. This, of course, means maximum support for the selected occlusal pattern and maximum distribution of resistance to the masticatory stresses.

2. The periphery should rest in soft tissue at every given point. Here, then, it must be understood that by "soft" tissue is meant the mucous membrane in the basal seating area, the immediate underlying tissue which is muscle, gland or connective tissue. "Hard" tissue is recognized as those areas of mucous membrane, the underlying tissue of which is bone, such as the hard palate, bony tuberosities, tori, the mylohyoid ridges, and the genial spines on the lingual surface of the mandible.

3. The periphery of the denture must terminate in harmony with the functional range of the border tissues. The value of this requirement is obvious.

4. There must be neither underextension nor overextension. Underextension results in the loss of retentive features of the denture base. Overextension of the periphery means interference with the function of the border tissues and can have only two results: (a) if the factors of adaptation and retention are stronger than the force of tissue movement and the denture stays in place, incision and abrasion of the border tissues result, and (b) if the force of tissue movement is the stronger, then displacement of the denture base from its seating area is inevitable.

Only one impression technic introduced in recent years has disagreed with or ignored these four fundamentals, and that is one that follows the so-called Mucostatic Principle. Shortly after its introduction it was recognized that disregard for these requirements was disastrous as far as the upper denture base was concerned. Retention based on surface tension and Avogadro's law did not seem to overcome Newton's law of gravity. Many operators, however, have reported that they have achieved successful lower dentures by this technic in spite of the small portion of basal seating area used; sharp, knifelike borders, and the crest of the mandibular ridge supporting the occlusal pattern in contradiction to the belief that the crest of the mandibular ridge is a secondary stress-bearing area.

With these four fundamentals in mind, it becomes obvious that the periphery of each denture is a basically important part, and there must be a definite location for its placement. This location is best determined, not by arbitrary design, nor by design based on previous experience, nor outlined and finished by a laboratory technician regardless of his experience, but rather by a procedure called muscle-trimming. Thus, this flexion line of border tissue movement is found for each patient, regardless of his history of oral surgery, fractures, trauma, or anomalies. Seventy per cent of the upper periphery and 95 per cent of the lower can be formed by muscle trimming. Therefore, it becomes evident that these segments of the peripheries can be fashioned by proper technic and suitable impression material so that neither overextension nor underextension will result, and the other fundamental requirements will be satisfied.

It must be recognized that there are two types of muscle-trimming: (1) the manipulated type in which the operator lifts or pulls border tissues beyond their normal physiologic range, in other words, beyond the extent to which the patient, himself, is capable, and (2) the voluntary type which is border tissue movement produced by the patient. In the latter type, the only necessary duty of the operator is to make certain that a suitable im-

pression material is placed in the proper area. An accurate muscle-trimmed border results in two important measurements: (1) the depth the periphery can extend into the buccal, labial and lingual border tissues, and (2) the width, or thickness, of the periphery in any given region. These two measurements, once determined, should be maintained in the finished denture, and are only altered in the labial regions to satisfy esthetic requirements.

PRELIMINARY IMPRESSION

The first step in an impression technic is to secure a preliminary impression from which a cast is made, and upon which a correct impression tray for the particular patient can be constructed. This impression must encompass more than the desired basal seating area, so modeling compound is the material of choice. A satisfactory preliminary maxillary impression should exhibit the following:

1. A good impression of the ridge, well centered in the tray.
2. Evidence of the impression material flowing to the height of the mucobuccal fold.
3. An impression of the hamular notches and soft palate, slightly distal to the desired posterior periphery of the finished denture.

A satisfactory preliminary mandibular impression should exhibit the following:

1. A good impression of the ridge, well centered in the tray.
2. An impression of the entire retromolar pads.
3. The indentations of the external oblique lines.
4. An impression of the retromolar fossae.
5. Evidence of the impression material flowing into the mucobuccal fold and on the lingual side, into the floor of the mouth, as far as the border tissues will permit.

Any preliminary impression not exhibiting these essentials should be retaken, and not corrected, because generally these impressions are too large to be reseated.

BUILDING THE IMPRESSION TRAY

The impressions are poured in regular plaster and the casts separated. The desired tray outlines are etched on the casts; all undercuts are blocked out with modeling clay; and one or more layers of red baseplate wax to act as spacers are applied to the casts extending to within 3 or 4 mm. of the peripheries. Trays can be constructed of any suitable material such as the self-curing resins. Regardless of the tray material used, the resulting trays must be rigid as well as durable.

TRIMMING THE IMPRESSION TRAYS

The trays are then ready to be tried in the mouth and prepared for the final impressions. With the spacer wax still in place, the upper tray is seated and the desired posterior periphery is established. The balance of the periphery is trimmed well short of the maximum movement of the border tissues. The lower tray is then seated, the posterior border on each side as it crosses the retromolar pad is determined, and the buccal and labial peripheries are shortened so that any possible movement of these border tissues cannot displace the tray. The lingual periphery is shortened until the tongue can make any movement possible, yet not displace the tray. This is a most important step in denture construction. If accurately done it determines the exact seating area of the denture.

Not infrequently the operator will learn that the vestibular border tissues can be lifted to the crest of the ridge, also, that normal movement of the tongue moves the lingual border tissues likewise, in which case there is no seating area

available. Surgery might be employed to create a basal seating area; otherwise, overextension of the denture border must result with all its discouraging effects. This is the problem in complete lower denture construction—not the flat mouth, or the soft, flabby ridge.

FORMING THE PERIPHERIES OF THE IMPRESSION

When this step has been accomplished and the trays will stay on the ridges regardless of border tissue movement, the operator is then ready to build the peripheries. Red stick modeling compound applied along the border is preferred for this step, because it enables the operator to work with any portion of the periphery until he is satisfied that it is complete and accurate. Rarely can this be accomplished in one attempt—in fact, several reheatings are necessary before a point is reached in which there are no further changes produced on the surface of the modeling compound by the movements of the border tissue. Then, and only then, can the border be considered thoroughly, accurately and completely muscle-trimmed. This is the advantage of modeling compound over any material which has a permanent setting time beyond which it is no longer moldable.

The permanent setting time is not a problem when building the upper periphery because the patient can be making all the voluntary movements of the border tissues while the material is setting; but it definitely is a problem in the lower. An impression material which sets permanently, registers the border tissue in the position that it is in at the time the material sets, but it is quite improbable that accurate peripheries can be accomplished simultaneously on the vestibular and lingual aspect of the lower impression within the setting time of any of the unmoldable materials. Excellent results can be obtained by building the modeling compound borders to manipulated border tissue movements because they will be just short enough of the required length to act as carriers of the selected finishing impression material, and thus allow the voluntary movements to form the peripheries accurately.

THE FINISHED IMPRESSION

When the muscle-trimmed peripheries have been accomplished, the spacer wax and any modeling compound which has flowed on the tissue side of the trays are removed, and the trays are ready to receive the finishing material. The zinc oxide and eugenol pastes are the most widely used; however, the rubber impressions are gaining in popularity. If the latter type is used, numerous perforations should be made in the tray with a no. 8 round bur to assure retention of the impression material and to provide free escape and flow of the impression material to prevent any distortional pressure on the underlying tissue.

Regardless of the type of impression material used, the mucous membrane should be thoroughly dried, even if medication is necessary to achieve this. The tray filled with the impression material should be carried gently to place, centered carefully to avoid pressure points, and allowed to remain until complete set has taken place. The impression then is removed carefully from the mouth, washed clean of any remaining saliva and properly boxed to preserve the peripheries. The cast is poured using the desired material, and the operator is ready to proceed with the next step in denture construction.

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Posterior occlusion

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Every dentist knows that he personally is responsible for the selection and arrangement of the anterior teeth. He knows that no face can be beautiful or handsome, youthful or dignified, without the expenditure of thought and care on the part of the dentist in restoring the most visible part of the dentition. However, this is also true of the posterior tooth selection and arrangement of the occlusal scheme. Many times this phase of the work is handed over to a technician without a qualm and occasionally without giving specifications for tooth form or size. The technician should not be placed in this position.

CRITERIA FOR SELECTION OF TEETH

The criteria for the selection of teeth are as follows: First of all, the length and width desired must be known. Perhaps the most common method is to measure from the cuspid to the retromolar pad and to use a mold that is wide enough mesiodistally to fill it. This is not necessarily a valid measurement. If this determination has been made on the lower left side of the mouth, the upper right side may not be equivalent. Ridges usually are not symmetrical. Because the lower cuspid is set mesial to the upper cuspid, the lower posterior teeth are usually about 3 mm. greater in anteroposterior dimension than the upper.

The length of tooth to be used must be determined. When vulcanite was utilized for a base, the distance from the occlusal surface of the wax rim to the high smiling line was measured and a tooth chosen to fill this space. It was thought best not to show any base material, if possible. With tinted or colored resins, this is no longer true. Teeth of pleasing proportion in length-width ratio can be used.

It is also important that efficient teeth be selected so that patients can chew with minimum effort. Much research and writing has been done in regard to this subject and it could be discussed at great length. Briefly, however, the cusp tooth seems to have a slight edge in efficiency. Cusp teeth seem to do better with meat, whereas broad flat teeth are advantageous in chewing nuts. Everyone is agreed that adequate sluicing is a very important factor. Teeth that have been ground too flat without escapeways, or even cusp teeth set in too close proximity, do not provide sufficient room for the food to move off the table, as the effort is made to bring the teeth close together. Patients will say, "I can't chew through my food." Resin teeth often wear into their opposing teeth in solid occlusion, only to lose efficiency and feel like "wooden teeth." This fact furnishes the key to another aspect of choosing an occlusal scheme. The patient likes to feel the teeth penetrate the food bolus. It gives him a feeling of satisfaction and accomplishment. To bite hard and merely squeeze food is

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frustrating, even though a person may be chewing better than he thinks. From the psychological standpoint, therefore, posterior teeth should be set so as to allow adequate sluiceways, or else additional grooves should be ground in the teeth themselves.

There are other factors which deserve much thought. Patients must be recognized as individuals. A nervous patient is more irritable, easily frustrated and responds to stimuli of less intensity. The mouth will often exhibit chronic soreness. There are many more women of this type than men.

These thin, high-strung women of menopausal or postmenopausal age are apt to be difficult prosthetic problems. Although many of these individuals have common symptoms, medicine cannot always furnish the answer or the remedy. They usually suffer loss of teeth from periodontosis, have rapid osteoporosis and a "burning or drawing" sensation which is often accompanied by arthritis. Some can be helped by a nutritional regimen and adequate vitamin intake. But for many the outlook is most discouraging. These patients need the finest and most accurate dentures, frequent adjustments, and a measure of understanding.

Age is an important factor in all phases of denture construction. Older people take longer to become accustomed to dentures. Their neuromuscular coordination is not as good as in youth, and the health of the tissues may be impaired.

People living in different geographical locations often exhibit contrasts in oral characteristics, a phenomenon sometimes overlooked when one procedure is advocated for everyone. It is only necessary to point out the high caries rate, the high incidence of periodontosis and rapid osteoporosis found in the northeast, whereas in some of the western states, tooth decay and bone resorption are negligible. Dentists have been heard to claim that they never have to refit a denture, or that when these teeth or that instrument are used, there is no resorption. This might be true in the area in which they practice, but it certainly is not true universally.

Still another factor of importance is the character of the mucosal support of the denture-bearing area. If it is firm and only slightly resilient, greater stability of the bases can be attained. If, however, some areas are flabby and vary in thickness to an extreme degree, the bases can be displaced easily.

POSITIONING OF TEETH

If interdigitated cusp teeth are used and set on a straight line articulator to a centric relation record only, the resulting dentures can be in error because of the following reasons: If the centric relation record is not accurate; if vertical dimension has been changed on the articulator, either by compression of green plaster in the flask, by overpacking, or by dimensional changes of the bases; if the cusps do not interdigitate on the closing arc of the mandible; if tissue was displaced in recording the jaw relation or a record was accepted that was made with ill fitting trial bases.

On the other hand, if flat teeth are set to a centric relation record on a straight line instrument, the error will be less significant if an exact centric relation has not been obtained or if the resorption is greater than anticipated. It is very true that inaccuracies will exist, but they will not be as critical or as damaging. However, where indicated, cusp teeth are preferable to flat teeth, provided they are either ground to eliminate anteroposterior locking, or are set up on an adjustable articulator to adequate positional jaw relations.

About two years ago, a guide for the use of various posterior tooth forms was presented.[1] I have found that flat poste-

1. Payne, S. Howard. Selective occlusion. J. Pros. Den. 5:301 May 1955.

rior teeth or upper teeth with cusps occluding with flat lower teeth will produce excellent results when the patient's ridges are flat and there is a large interridge dimension present. These characteristics go together and are usually found in the older patient. Where ridges are malposed, malformed, or deviated, the flat tooth form also works well. Minimum pressure should be used in making the centric relation record, so that premature posterior contact can be avoided in the finished dentures. Otherwise, grinding may destroy the occlusal patterns. Cusp teeth which have been opened up and modified to eliminate interlocking, or cusp forms which do not interlock can be used where ridges are normal in relationship and contour. The buccal cusps seem to be useful in keeping food on the table.

Remounting the finished dentures for spot grinding and milling is a step which minimizes the number of postinsertion adjustments. If minor, the occlusion can be refined in the mouth by using a disclosing wax or paste on the tooth surfaces. The patient closes his jaws in the various excursions and the high spots can be touched up with a small stone without removing the paste each time.

The teeth should be set as closely as possible to where they grew. Malpositioned teeth should be corrected, of course, but the mechanical idea that teeth should be set lingual to the ridge to get stability can be overdone, and function and speech may be impaired. There is no substitute for normal physiology.

COMMENT

Proper diagnosis is extremely important when dentures are planned and posterior occlusion determined. The responsibility for denture planning belongs to the dentist alone. He must not delude himself by letting a commercial laboratory do his denture work without direction. A denture is more than a piece of hardware; it will always need to be a physiological restoration.

Occlusion in partial denture restorations

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Since correct occlusion is one of the main attainments to be desired in all oral restorations, it becomes foremost in importance and function in the complex field of removable partial denture service. This field is complex because removable forms of restorations depend on both the hard and soft tissues for support and function, in contrast to fixed partial dentures (fixed bridges) which rely on tooth structure alone for support. The major portion of this paper will deal with the nature of occlusion, occlusal problems and the solution to these problems in removable partial denture construction.

Occlusion may be broken down into three basic categories: (1) correct or ideal; (2) adequate and (3) inadequate or traumatic.

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Only in ideal cases is it possible to obtain ideal occlusion in denture construction. Any wide deviation from normal may result in the next best type of occlusion—that of adequate occlusion.[1] Adequate occlusion, from a prosthodontic point of view, is that which restores occlusal functions satisfactorily, yields an acceptable esthetic result, and helps maintain a normal physiologic condition of all supporting tissues. In most instances of removable partial denture treatment, when segments of the arches have been missing, adequate occlusion may be the best result obtainable.

Inadequate or traumatic occlusion results when the teeth are in supraclusion, infraclusion or are improperly contoured. The problem involves not only the occlusal surfaces themselves, but also (1) occlusal plane orientation, (2) incisal guidance and (3) condylar guidance. All these factors must be in harmony with mandibular movements, or some form of traumatic or inadequate occlusion will ensue.

Complex problems of replacement, function and maintenance of remaining arch segments arise when any segment of the dental arch is lost. In solving these problems it is important to retain and preserve the remaining oral tissues in a healthy, functional condition.[2] Lost teeth must be restored adequately within a reasonable length of time or a progressive breakdown of the remaining dentition usually will follow.[3] This breakdown complicates the problem and makes the achievement of an adequate prosthesis more difficult or sometimes impossible.

To replace lost teeth as individual parts or as segments of the arch, removable partial dentures or crown and bridge restorations are utilized. Crown and bridge restorations are advisable when satisfactory abutment teeth are present, and function is desired from "natural support."[4] Correct practice dictates the use of crown and bridge restorations whenever possible because, when indicated, they restore function and preserve oral tissue for the longest possible time.[5]

For many years, exponents of fixed bridgework believed that planned lateral movement in abutment teeth was necessary for the normal physiologic stimulus and health of the supporting periodontium. It is now recognized that any vertical pressure, parallel to the long axis of the teeth, will adequately stimulate the periodontium so long as this pressure is within the limits of physiologic tissue tolerance and is distributed equally.

Prior to the restoration of a partial loss of occlusion, the existing dental arch and its opponent must be put into proper repair and function; proper repair includes (1) removal of caries, (2) restoration of teeth to normal form and contour, (3) restoration of the normal occlusal plane, (4) restoration of the periodontal tissue to health, (5) realignment of teeth by orthodontics to proper arch form and accepted esthetics, (6) removal of all pathologic tissue and (7) elimination of disadvantageous contours, undercuts, excessive hyperplastic tissue and excessive bony masses in order to allow sufficient space between upper and lower denture and to provide a smooth alveolar ridge.

All restorations should be constructed of indestructible material and formed and contoured so that physiological stimulation of the supporting tissues may be maintained. Proximal contacts must be placed properly and marginal ridge alignment and height carefully considered. Of prime importance, centric occlusal contacts must be distributed evenly and properly throughout both

1. Moore, A. W. Ideal versus adequate dental occlusion. J.A.D.A. 55:51 July 1957.

2. Applegate, O. C., and Nissle, R. O. Keeping the partial denture in harmony with biologic limitations. J.A.D.A. 43:409 Oct. 1951.

3. Anthony, L. Pierce. American textbook of prosthodontic dentistry, ed. 7. Philadelphia, Lea & Febiger, 1947, p. 55.

4. Baker, C. R. Why fixed partial prosthesis? J. Canad. D. A. 16:565 Nov. 1950.

5. Morris, M. L. Periodontal aspects of removable partial denture prosthesis. New York J. Den. 23:219 May 1953.

arches and all eccentric excursions freed from traumatic interference. Proximal contours and extensions must be so constructed that they will give proper areas for: (1) retention, (2) stabilization and (3) prevention of recurrence of decay. Additionally, they should provide proper bracing and splinting actions for the prosthesis.

The proper selection of restorative material is essential in order to maintain the appliance in a serviceable condition over a long period and to prevent it from wearing excessively under occlusal stress. Amalgam restorations will wear faster than enamel or gold under cast clasp movement.[6] The use of wire clasps rather than cast clasps will avert much surface amalgam wear. Gold restorations, when esthetically acceptable, are the restorations of choice in the preparation of the attachment teeth for removable partial dentures.

When individual teeth or segments of teeth are lost, stability of the remaining teeth is threatened.[7] One bad feature of the resultant instability is the damage done to the plane of occlusion. In preparing a mouth to receive removable partial dentures, the occlusal plane must be made uniform, with all existing infraclusion or supraclusion of the migrated teeth eliminated. The removable partial denture occlusion must then be made continuous and harmonious with the reconditioned occlusion of the remaining natural teeth.

The periodontal tissues surrounding the teeth, especially those designated as abutments, must be placed and retained in the highest state of health. This condition, by aiding the periodontal membrane to function properly, aids the abutment teeth to bear the added load from the forces and pressures of the removable partial denture. All questionable teeth should be eliminated if possible. If questionable teeth must be retained, adequate periodontal care must be provided and any required endodontic treatment completed properly. The proper adjustment and equilibration of the occlusion and articulation is essential as no removable partial denture can be any more functional than the occlusal pattern permits. An out-of-balance partial denture will result from an out-of-balance natural occlusal pattern.

Malaligned teeth and arch relations must be adjusted to as near normal as possible by a competent orthodontist so that a harmonious facial and occlusal effect may be obtained by the completed removable partial denture. To neglect to adjust properly a natural dentition may lead only to failure in removable partial denture service and doom the dental apparatus to a rapid breakdown.

All pathologic tissue must be removed and examined by a pathologist if necessary. To overlook any such tissue would invite further inflammation and early breakdown of the usefulness of the prosthesis.

Surgical intervention in many instances is necessary to prepare properly a partially edentulous ridge. The most prevalent complication is that of insufficient denture space in the posterior region of the mouth. Often, maxillary tuberosities must be reduced to provide sufficient denture space between the upper and lower ridges. Opposing teeth usually have drifted and extruded toward their opposing edentulous ridges, and when the length of such teeth cannot be reduced sufficiently they must be extracted and the ridge trimmed to provide a smooth denture base supporting area. Both severe bony and soft tissue undercuts in many instances must be reduced, especially when they are severe and bilateral. This reduction of ridge bulk usually will have no reductive effect on the usable supporting area. Large hyper-

6. Phillips, R. W., and Leonard, L. J., Jr. Study of enamel abrasion as related to partial denture clasps. J. Pros. Den. 6:657 Sept. 1956.

7. McGonagle, R. W. Loss of teeth as a danger in the development of occlusion. J.A.D.A. 50:57 Jan. 1955.

plastic masses, especially on supporting areas, are removed to gain a more firm and "nearer-to-the-bone" support. Any abnormal or undesirable ridge undercut, or sharp area, is better removed than compensated for in denture base construction.

After the existing oral tissues have been prepared to provide near maximum support within their tissue tolerance limits, the next procedure in restoring occlusion may be divided into four basic steps: (1) support, (2) occlusal contacts, (3) articulation (dynamic occlusion) and (4) design.

SUPPORT

Support for removable partial dentures is derived from two basic sources: (1) teeth and (2) soft tissues.[8] This action is known as combination support. With the one kind of tissue being rigid and nondisplaceable and other yielding and displaceable, the problem of equalizing the distribution of support between the two makes removable partial denture service most difficult and complicated.

Hard Tissue Support • Good judgment dictates the use of occlusal rests on all abutment teeth. Some dentists prefer to use occlusal rests on the abutment teeth which are located away from the edentulous region. The majority of rests are placed on abutment teeth adjacent to the edentulous region.

Following are the basic rules governing the preparation of occlusal rests:

1. Enamel is removed to a depth of approximately 1 mm. occlusally, and the opposing occlusal contact is freed that much in order to provide sufficient bulk of occlusal rest material that will give support and not fracture.

2. Anteroposteriorly, the rest preparation should end in the adjacent occlusal pit.

3. Laterally, the preparation should be at least one-half the width of the occlusal surface.

4. The floor of the rest must be perpendicular to the long axis of the tooth.

5. The occlusal floor cross-section outline must be saucer-shaped and contain no line or point angles.

6. The occlusoproximal angle must be rounded to receive sufficient bulk of material that will enable the rest to resist fracture in that region.

7. The entire preparation must be in tooth enamel or in a properly placed restoration; no exposed dentin should be evident.

8. All surfaces must be smoothed and highly polished for self-cleansing.

Other forms of rests may be utilized, such as sharp-angled deep rest preparations in restorations, precision interlocking devices, telescopic crown pieces and multiple rests or bars. Each of these types of rests has its advantages, but each must be used with a certain definite type of removable partial denture restorative system. A common and adequate partial denture system utilizes a rest which offers sufficient resistance to vertical forces but yet may move upon its base without injurious effect on the supporting tissues of the abutment tooth. All clasped abutment teeth should utilize adequate rests, and all teeth with rests should be clasped, if for nothing else, at least for stability.

Soft Tissue Support • The edentulous ridges with their underlying bone are the main support of the denture base for free end saddle dentures. When teeth are present at both ends of an edentulous area, rests on tooth structure alone are used unless the span is extremely long or the abutments weak. Combination support in such instances would be difficult to obtain and never constant.

8. Applegate, O. C. Essentials of removable denture prosthesis. Philadelphia, W. B. Saunders Co., 1954, p. 1.

In free end saddle dentures where the soft tissue displacement may be many times that of the hard tooth tissue displacement, some form of adequate functional impression and registration must be utilized to maintain uniform restored occlusal contact when the natural teeth are in contact. A free end saddle denture made from a static impression will not maintain occlusal contact for any length of time, as this type of denture will always settle out of maximal occlusion.

As occlusion is most efficient when there is maximum contact between the opposing teeth, a supported occlusal segment that stays in proper vertical position is desirable. With ridge areas being of variable displaceability, the functional form of impression-taking becomes mandatory. One such form depends on digital pressure to displace supporting soft tissue;[9] another utilizes a tissue-flow wax to load evenly the displaceable tissue.[10] Satisfactory impressions are obtained more consistently with the use of tissue-flow wax than with the use of digital pressure, as the inherent properties of the wax at mouth temperature offer the least variables. This type of "functional impression" is one that registers over-all tissue support, that is, an evenly distributed tissue displacement that in turn will support the equal and opposite forces as applied and directed from opposing functional occlusal surfaces.

The other major factor in obtaining full tissue support is that of securing a good impression of all possible supporting areas without interference to adjacent tissues. Here adequate thickness, contour and polish of the denture base and its periphery allows for maximal usable coverage.

To utilize properly any tissue support area, an accurately fitting denture base is used. The only completely accurate base is cast of metal. Metal bases are not only accurate in their fit and even distribution of pressure but they also have the following advantages over plastic bases:

1. Accuracy of initial fit.
2. Accuracy in maintaining fit.
3. Ability to retain a high polish and be self-cleansing.
4. Less bulk for sufficient rigidity.
5. Ability to transmit heat and cold to underlying tissues.
6. Ability to transmit tissue surface heat away from tissues.
7. No infringement on functional tissue areas, that is, tongue, cheeks.
8. More compatibility with oral tissues.

OCCLUSAL CONTACTS

Having provided a supporting base that will distribute evenly the occlusal forces over the underlying tissues, the dentist also must provide an occlusal pattern that will evenly transmit supporting forces to these bases. Equalization of occlusal forces and contacts in the artificial dentition should be copied from and should harmonize with the existing dentition as accurately as possible. Since many factors influence occlusion and articulation, the most adequate and accurate results are obtained by the use of the mouth itself. This form of registration is known as functional cusp path registration.[11] This registration is dynamic, and is taken under the functional pressure of jaw movements. The denture base in turn supports this pressure through its form gained by the functional impression. Using the combination of functional registrations and impressions, tooth occlusion may be maintained for the longest possible time, especially if obtained in conjunction with metal bases.

Functional registrations alone do not

9. Hindels, G. W. Load distribution in extension saddle partial dentures. J. Pros. Den. 2:92 Jan. 1952.
10. Applegate, O. C. Partial denture base. J. Pros. Den. 5:636 Sept. 1955.
11. Applegate, O. C. Essentials of removable denture prosthesis. Philadelphia, W. B. Saunders Co., 1954, p. 200.

complete the occlusal form. For maximum efficiency, narrow buccolingual occlusal surfaces may be used and excessive buccal overjet procured. Excessive buccal overjet always should be used in restoring occlusion in both fixed or removable bridgework or in partial denture construction. By this means, cheekbiting is prevented and adequate spillways into the buccal vestibule are provided, making the chewing pressure of foods less, and mastication more efficient. The less pressure involved in chewing, the less pressure will be exerted against the soft tissue ridges.

All occlusal grooves should be deepened and sharpened so that adequate or excessive embrasures and sluiceways are created. The object is to gain easier perforation of foods with easier flow of foods across the occlusal tables. Maximum centric interdigitation should be evident in centric relation with no premature contacts present. Eccentric paths must offer sufficient contacts for function with no traumatic interference. Sufficient occlusal area must be restored to enable adequate mastication and at the same time offer proper stimulation to opposing natural teeth. No plunging cusps or deep overbites should be created which might promote periodontal breakdown. All surfaces must be highly polished and self-cleansing.

The choice of material to be used to restore the occlusal surfaces bears consideration. Contacts against natural teeth must not damage enamel or any restorations which they may contain. Occlusal surfaces for prostheses may be constructed from (1) gold, (2) porcelain or (3) plastics. First choice should be medium hard gold, as this material most resembles the characteristics of enamel. Second choice, and one that is widely used and adequate is porcelain. In recent years plastic teeth have become popular. Plastic teeth are satisfactory so long as they occlude against other plastic surfaces or tooth enamel. Plastics should never be placed opposite gold occlusal surfaces as they seem to gather and retain small minute particles which rapidly abrade the gold.

Chrome-cobalt alloy should never be used on occlusal surfaces of the teeth as it is too hard and rigid, resulting in extensive damage to the supporting structures of the opposing teeth. Occlusal removable onlays should be used with caution and then only in conjunction with the combined occlusal support of natural occlusal contacts. Increase in vertical dimension must never be brought about by removable partial dentures alone; accompanying fixed restorations must be used to help maintain the increased vertical dimension. This fundamental cannot be violated.

If anterior replacements are necessary, deep overbites must be reduced as much as possible within acceptable esthetics. All occlusal interferences should be removed or reduced to a minimum.

ARTICULATION

Articulation of occlusal surfaces is dynamic or moving occlusion. This type of occlusion is evident during functional and mandibular glide patterns. From the static, uniformly balanced centric occlusal contacts, eccentric contacts must be made harmonious with mandibular movements so that functional contacts are preserved without traumatic interference within any given pattern range. On the working side of a lateral eccentric movement, all possible functional contacts must be placed from the last molars forward through the cuspid on that side. Lateral and central incisors may be included if no interference is encountered. The greater the contact length anteroposteriorly, the greater is the over-all distribution of forces. Balance, opposite the working side, in removable partial denture function may not be evident if the natural dentition is not in contact, but no occlusal interference may be present.

Protrusive position requires sufficient incision from all possible incisors in balanced unison and with no interference from the posterior teeth. Distal molar balance is desirable and should be obtained if possible. Adequate vertical arch separation by second molar occlusion is necessary to maintain sufficient interarch separation for the temporomandibular joint's normal positional relationship against the vertical vector of forces derived from the muscles of mastication. Proper distribution of all eccentric occlusal forces must be present to maintain the health of the oral tissues, retain neuromuscular balance, and give adequate comfort and function to the patient.

DESIGN

Correct removable partial denture design plays its part in providing and maintaining satisfactory occlusal function. Stability of the removable appliance to maintain proper relationships is gained by cross arch distribution of forces and stresses. Clasps are designed to function with sufficient retention without destruction to the teeth. Indirect retention is provided to help resist dislodging movements of the saddle. Splinting action is accomplished by tying together segments of the teeth so as not to overwork single or weaker segments. The abutment teeth are contoured correctly so as to permit the food to flow over them and stimulate the gingival tissues, aid the function of the lingual and buccal tissues, and provide a self-cleansing action to functional dental areas.

SPECIAL DESIGNS

In certain definite patterns of missing teeth and opposing occlusion, definite designs may be used to advantage. Edentulous areas bounded by natural teeth, where for some reason fixed bridges are not constructed, may be replaced by a modified type of removable bridge.[12] This type of restoration functions somewhat like a fixed bridge although, being removable, it provides a functional occlusion, and promotes the health of the periodontal tissue.

Removable partial dentures occluding with complete dentures do not need functional occlusion or functional impression methods, because the opposing complete denture can exert only one tenth of the possible natural closing forces against its antagonist.

In instances in which only the lower anterior segment of teeth remains, removable partial dentures may be constructed so that occlusal forces are borne by the long posterior edentulous ridge areas, and not by the weak remaining abutment teeth. Here the occlusal-saddle portion works 100 per cent independently from the anterior cast removable framework, with the anterior framework acting as a splint to help maintain the periodontal health of the few remaining teeth.[13]

SUMMARY

Occlusion is the result of restorative endeavor. It may be ideal, adequate or inadequate. Adequate occlusion in removable partial dentures depends on and is maintained by the several factors making up the entire restorative procedure necessary to support the desired occlusion. Preservation of existing oral tissue is the prime factor in removable partial denture service. Preservation of the periodontal tissues is maintained whenever possible. Occlusal functions are maintained uniformly by force distribution and balance within tissue tolerance during masticating functions. The proper design of all component parts and their

12. Hall, Walter A., Jr. Modified tooth replacement in removable restorations. Unpublished.

13. Hall, Walter A., Jr. Tissue preservation factors in removable partial dentures. Unpublished.

related functions make adequate or ideal occlusion a reality.

CONCLUSION

Dental arches must be prepared properly to receive removable partial dentures. Functional occlusion and functional registration are necessary for creating and retaining adequate tooth occlusion. Metal bases are superior to any other type. Gold occlusal surfaces are indicated when artificial teeth occlude with the natural dentition.

Postinsertion problems in complete denture prosthesis

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During the past two decades there has been truly significant growth in the field of prosthodontics. Dental education has placed emphasis on the interrelation of the basic sciences and the clinical sciences. Research has developed from a bare compilation of clinical data to a position observed today as a major effort contributing to the total knowledge for the benefit of the patient.

Because of these scientific developments, there has evolved a better and more complete understanding of the need for the restoration of lost function through the application of mechanical principles and biomechanics to denture prosthetics.

The rapid development of technics at times has overshadowed the fundamental premise on which diagnosis and treatment must rest. Too often a strictly mechanical procedure or a special material has been offered in lieu of sound basic principles. Such basic concepts as centric relation, vertical dimension, physiologic rest position and occlusion have been questioned and, in some instances, cast aside as being of little consequence. The growth and development of newer knowledge has placed added value on the scientific application of the associated sciences for the successful treatment of the edentulous or partially edentulous patient.

The subject of this paper, "Postinsertion problems in complete denture prosthesis," has been selected for a purpose. There is reason to believe that, all too frequently, a complete denture fails to satisfy the objectives of treatment because treatment, in the full sense of the word, was not completed. The careful and scientific approach for the treatment and correction of postinsertion problems in complete denture prosthesis is just as important as the scientific development of the dentures. When dentures are delivered to the patient, the first, or preinsertion phase of treatment—the biomechanical phase—is completed. The second, or postinsertion phase, is based on the following requirements:

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Dean, College of Dentistry, New York University.

1. Confidence that all steps of construction have been completed to the satisfaction of all scientific and technical demands.

2. Confidence that the restorations meet all anatomical and physiological concepts.

3. Confidence that the patient has been psychologically prepared to receive artificial dentures.

If the requirements of the basic principles relating to these three all-important points have been met, the postinsertion problems should not be many. It is not possible, because of space limitations, to discuss postinsertion problems separately; however, reference to the subjects previously described is within the scope of this paper.

Under the headings of "steps of construction" can be listed those problems which relate to retention and stability. The lack of retention and stability usually is traceable to a faulty impression or malocclusion.

The impression for a complete denture must represent an imprint of the mucosa which will be covered by the denture base. The impression material must be one that will allow a reproduction of the mucosal structures in an unstrained rest position. Impressions which displace and impose strain on the underlying structures frequently are a causative factor in a feeling of insecurity by the denture patient. The resilient nature of the mucosa will always return it to an unstrained rest position which, unless provided for at the time of the impression, will not be in harmony with the mucosal surface of the denture base. Unless both surfaces are in closest apposition, interfacial surface tension, a major factor of denture retention, will not be effective.

There are two major factors in denture retention—interfacial surface tension and the effect of atmospheric pressure. Each factor is developed at the time of the final impression; each must be in constant effect in the completed denture if the patient is to feel the security of maximum retention. When one is missing, the denture is suspended in such a way that adequate function seldom is possible.

With reference to occlusal factors relating to postinsertion problems, there are certain definite basic principles for the setting and arranging of teeth for denture retention and stability. Balance is necessary in centric occlusion, other factors, of course, being equal. There must be harmony of occlusal contact in the centric occlusion if denture retention and stability are to be maintained throughout the repetitious functional cycle. Premature contacts must be eliminated before insertion or corrected after insertion. This correction can be done only by scientific transfer to an adequate articulator. It is not possible accurately to locate or eliminate occlusal disharmonies by selective grinding in the mouth.

The postinsertion problem of soreness under the denture base is also a factor relating to retention and occlusion. It is related to retention because, so frequently, satisfactory and functional retention is destroyed or lost because adjustment and relief of sore spots result in the mutilation of the denture base. It should be remembered that soreness which is localized is traceable to an extremely small spot on the denture base or to traumatic resultants from the occlusion. In either case, a localization of the cause is necessary, and correction is accomplished with very small stones or burs. Large stones or vulcanite burs have no place in this phase of prosthodontics. Overeagerness to relieve immediate discomfort should be avoided, and in the early days following insertion, only regions exhibiting obvious objective symptoms should have relief. Each patient must and will reach a degree of toleration which, in a large measure, is physiological and an important part of the treatment.

ANATOMIC AND PHYSIOLOGIC CONSIDERATIONS

Restoration of function for the edentulous patient is based on anatomic and physiologic considerations. After the loss of the teeth, there is, to a varying degree, a loss of anatomic structures, a change of anatomic relation when compared to the normal, and considerable atrophy of the relating integument. Naturally these changes result in altered function. The responsibility for restoration of lost structures and physiology is grave; not only is restoration of function required, but also a restoration that will be esthetically pleasing.

There are several postinsertion problems which are traceable to certain unalterable anatomic and physiologic considerations. Predominant among these considerations are: (1) centric and vertical relation; (2) physiologic rest position; (3) interocclusal rest space (freeway space), and (4) expression and esthetics.

Perhaps one of the most common causes of severe postinsertion discomfort and failure of the denture is faulty centric relation. It has been stated that ". . . the success of most dentures depends upon the patient's ability to chew . . . and . . . no single factor in all dentistry is equal in importance to centric relation."[1]

"Centric relation" is defined as ". . . the most retruded, unstrained position of the condyle in the glenoid fossa, at any degree of jaw separation, from which lateral motions can be made."[2] The position is the termination, the end, or final position of the normally related anatomic structures of the temporomandibular joint to satisfy the physiologic demands of the act of swallowing. In many patients with restorations who exhibit postinsertion symptoms, the primary cause can be traced to improper positioning of the mandible in a relation not in harmony with the physiologic centric relation.[3] Centric relation is not taken—it is recorded. It is unalterable because it is inherent in each person. The recording of vertical dimension and interocclusal rest space must also be included when the importance of centric relation is being stressed, because vertical dimension is a part of the centric record. Vertical relation that is excessive will be an etiologic factor in general discomfort of the supporting structures, irritation of the crest of the mandibular alveolar bone, and eventual loss of retention.

Another common symptom associated with excessive vertical dimension is premature contact of the teeth and clicking or clattering. This symptom, other factors being satisfactory, indicates that the interocclusal rest space has been invaded. Muscle fatigue will also be evidenced because physiologic rest is not possible when dentures of excessive height are in the mouth of the patient. In no way must physiologic rest position be confused with interocclusal space. To signify the importance of physiologic rest position, however, the interocclusal space, of necessity, must be considered as part of the entire anatomic and physiologic picture with a definite functional purpose in the over-all and final consideration. This space develops and is established in varying degrees during the growth and development of each person. Any attempt to invade or alter this interocclusal space beyond certain natural limitations will not be tolerated and will spell failure for the completed dentures.[3]

A faulty recording of centric relation or excessive vertical dimension can be corrected only by remaking the dentures. Occlusal patterns and balance at one height will not be in harmony with centric relation and the axis of rotation of the condyles if the vertical dimension

1. Granger, E. R. Centric relation. J. Pros. Den. 2:160 March 1952.

2. Kingery, R. H. Review of some of the problems associated with centric relation. J. Pros. Den. 2:307 May 1952.

3. Nagle, R. J. Temporomandibular function. Oral Surg., Oral Med. & Oral Path. 8:500 May 1955.

is lowered. Such disharmony will aggravate the discomforting syndrome.

ESTHETICS, EXPRESSION AND PHONETICS

One of the most common and disconcerting postinsertion problems relates to appearance. This reference, however, has two distinct segments of consideration—the appearance of the teeth in size, arrangement and shading, and the restoration of expression or tone to the facial structure.

Because of the many improvements during the past several years in the shades of artificial teeth and the improved carvings, there is no excuse for problems in the first part of this phase of prosthodontics. The newly developed vacuum-fired porcelains and also the new plastics now make available restorations that defy detection. The restoration of expression and the placement of the facial structures into normal relationship is, regretfully, another matter. Many patients do have just cause for complaint because the lips and cheeks do not have proper support.

The orbicularis oris muscle is dependent entirely on the position of the teeth for proper support and expression. The flange of the denture does in part support the related structures, especially in the cuspid region and the incisive fossa; however, the main support and the positioning of the vermilion portion of the lip come from the teeth.

In this phase of treatment, it must be recognized that the basic theories of years ago which dictated tooth ridge relationship do not hold true in the light of present day knowledge.

It is not possible properly to support the structures of the lips and cheeks and at the same time place the teeth over the crest of the residual ridge. As resorption occurs after the extraction of the teeth, the entire maxillary ridge moves palatally. The mandibular alveolar ridge resorbs lingually in the anterior segment and buccally in the posterior.

The mechanical advantages of an ideal tooth-ridge relationship are well recognized and must be rigorously adhered to for the mandibular posterior teeth if stability of the mandibular denture is to be satisfactory. Fixed mechanical concepts, however, are of little avail if the patient is not satisfied or will not use the dentures. To support the muscles of expression properly, and especially the orbicularis oris, the anterior teeth, both maxillary and mandibular, must be set labial to the ridge, and the maxillary posterior teeth should have some degree of buccal relationship.

This type of coordination between mechanical principles and esthetic factors will give the patient the greatest satisfaction. Developing the tooth arrangement in this way also is of considerable aid in the phonetics problems of the patient, because it eliminates tongue crowding, which is one of the chief causes of speech defects in the denture patient. Phonetics is seldom a serious postinsertion problem because of the remarkable adaptability of the patient.

PSYCHOLOGIC FACTORS

Up to this point, some postinsertion problems relating to retention and occlusion, anatomic and physiologic factors and concepts have been discussed, and certain principles of denture construction. These, in a large measure, are tangible, the symptoms are mostly objective, and the measures for correction approachable without too much difficulty once a diagnosis of the underlying cause has been made. Postinsertion problems of a psychological nature, however, are difficult, and often the most difficult, to eliminate. The psychological preparation of the patient should be started at the first appointment if the postinsertion difficulties are to be kept to a minimum.

Most patients' transition from natural

dentition, through the years of partial prosthesis, to the edentulous condition, has been filled with many anxieties and much concern. Free discussion of any subjects relating to prejudices should continue throughout the entire period of treatment. Assurances should be given regarding the period of adjustment after the insertion of the dentures. The dentist should encourage the patient to think aloud in order to learn of the possible dislikes and resistance which might become dominant factors later. The shade and size of teeth may be something which have had constant emphasis throughout a lifetime; if at all possible these desires must be satisfied.

The patient should be informed of the difference between retention of a denture and the firmness of natural teeth. Such explanation should be presented, however, in a way that will instill confidence that the dentures will be beneficial and comfortable from the viewpoint of health and appearance.

The patient who has been properly oriented to receive dentures fully realizes that treatment has not been completed when the dentures are inserted for the first time. The patient will understand that there will be adjustments necessary before a real degree of comfort is attained, and that there is a considerable change toward increased function even during the short lapse of several days, and that speech difficulties are of short duration. If the proper approach is used and the appropriate information imparted, the denture patient will reach a decision in his own interest, and the intangible, nonobjective, psychological postinsertion problems can be avoided or kept to a minimum.

There are many problems relating to systemic factors which cannot be included in this paper because of the complexity of their nature and also, as previously mentioned, because of space limitations. Reference, however, to the importance of systemic disease should be made because of the many difficulties evidenced when dentures are constructed for patients not physically well. To make dentures for a sick patient or one in immediate convalescence is to invite postinsertion difficulties. Denture retention and function require good tissue tone and vigor of structures, seldom present in a patient suffering from disease or malnutrition. Obvious symptoms, both physical and mental, should be referred to the proper medical authority for treatment before denture treatment is started, except when dentures are of necessity a part of the entire plan of treatment.

In summary: the treatment phase in complete denture prosthesis is not completed when the dentures are inserted. Careful attention to postinsertion problems is essential to the successful treatment of each patient. These problems can be minimized by meeting all scientific and mechanical considerations for each step. Inherent and unalterable anatomic and physiologic factors must be respected, carefully recorded and maintained.

The state of mind of the denture patient plays a dominant role; because of this, the psychological preparation of the patient is a necessary and major part of the treatment.

The making of complete dentures for patients not in good health should be delayed until recovery is complete, except in instances that require dentures as a part of the general plan of treatment.

The dentists' responsibility enters many areas. It embraces not only the fabrication of a denture but also the application of basic and clinical sciences, together with a complete understanding of the patient's personality.[4] It is the coordination and application of these basic features that will insure successful results and eliminate difficult postinsertion problems.

4. Landa, J. S., and others. Dynamics of psychosomatic dentistry. Brooklyn, Dental Items of Interest Pub. Co., 1953.

The intramucosal insert: a method of maxillary denture stabilization

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The accepted method of restoring an edentulous jaw to a state of proper function and esthetics is with a complete denture prosthesis. This procedure is probably the most frequently used in replacing lost organs in man. To be considered acceptable, a denture must satisfy requirements of mastication, esthetics and phonetics.[1] It must be stable and retentive if the patient is to chew and speak with comfort.

Although the average edentulous maxilla does not present a formidable problem in complete denture construction, there are certain instances in which the prognosis may be questionable. If the history and clinical examination indicate an abnormal maxillary anatomy or arch form, completely resorbed tuberosities and alveolar ridges, cleft palate, injured or diseased jaws, a tendency to gag, hypersensitive pharyngeal reflex, or inability to retain a conventional denture, the possibilities of restoring the maxilla are less hopeful.

When a conscientiously constructed denture, fabricated within the tenets of accepted patterns, fails, an alternative is available which may convert an unusable appliance into a functional prosthesis. This technic is often satisfactory enough to permit altering the denture to a horseshoe shape; positive retention is offered by utilization of intramucosal inserts.

METHOD OF RETENTION

Tiny snap-fastener type buttons known as intramucosal inserts are utilized (Fig. 1). These devices are placed into the tissue-borne surface of the denture, and epithelization of the oral tissues is encouraged into the tiny undercut cul-de-sacs. Eight to ten of these little devices offer an excellent source of positive retention. The basic method as introduced by Dahl[2] and Nordgren[3] in 1950 and improved by Jermyn[4] a few years later has not been materially altered.

ARMAMENTARIUM

The armamentarium that is required is simple and inexpensive. It is as follows:

1. Intramucosal inserts: such inserts are available in two sizes, 2.0 mm. and 2.5 mm. in head diameter. They are constructed out of nonreactive metal and are

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The intramucosal inserts used were supplied by the Denserts Co., Rochester, N. Y.

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†Associate attending dentist, Unity Hospital, Brooklyn.

1. Schlosser, R. O. Complete denture prosthesis, ed. 2. Philadelphia, W. B. Saunders Co., 1946.

2. Dahl, G. Subperiosteal implants and "superplants." D. Abst. 2:685 Nov. 1957.

3. Nordgren, L. Personal communication, 1954.

4. Jermyn, Arthur. Unpublished data.

Fig. 1 • Mucosal insert

Fig. 2 • Indicator stylus

elliptical in cross-section which permits them to be seated into shallower tissues than if they were round (Fig. 1).

2. Surgical indicator styluses (Fig. 2): these tiny pointed instruments are seated in prepared depressions in the denture before it is placed in the mouth. When the denture is positioned, the styluses mark the mucosa by puncturing it. These marks indicate where the inserts will ultimately be placed in the tissues.

3. The trephine: this circle-cutting instrument consists of a knurled handle with a luer-lok coupling, an 18 gauge needle machined to an evened sharp edge, and a stylet to clean the lumen.

4. The base preparing bur: a specially designed bur constructed to cut a seat in the denture base of the proper size to permit precise placement of either the insert or stylus. It is used in a dental handpiece (Fig. 3).

5. Self-curing acrylic resin and facilities to paint it into the denture.

6. Indelible pencil.

7. Local anesthetic.

8. Maxillary denture prosthesis in perfect balance with mandibular prosthesis, implant, or teeth. The denture base should be constructed of acrylic resin.

USE OF MATERIALS

The utilization of the materials listed is not difficult, nor are the steps complicated. The operator should assure himself that the denture is not overextended peripherally and that the occlusion is in flawless balance. Except in patients with severely uncontrolled diabetes, there are no contraindications to the procedure. The surgical phase may not be more traumatic than a single dental extraction, and the quantity and concentration of anesthetic solution required is half that needed for the removal of one tooth. If a patient is well enough to be ambulant, a general rule of thumb would indicate that he is well enough to undergo the insert procedure.

Since this technic is not familiar to many practitioners, a glossary is included so that the procedures herein described will be understood better.

An intramucosal insert (Fig. 1) is a nonreactive metal appliance which, when affixed to the tissue-borne surface of a denture offers added retentive qualities to it. It consists of several parts: (1) the base—a round, two-tiered, discoid structure, 4.0 mm. in diameter, and 1.3 mm. high; this portion of the insert will afford solid anchorage of the device in the denture when imbedded and covered over with self-curing acrylic resin; (2) the cervix—the constricted, highly polished portion which connects the base to the head; (3) the head—the elliptically-

Fig. 3 • Trephine used to remove tissue

Fig. 4 • Sharpened millimeter probe

shaped highly polished portion which is designed to obtain retention about itself when placed into the mucosal tissues.

The surgical indicator stylus (Fig. 2) is an instrument devised to mark the spots or sites in the tissues overlying the alveolar ridges where the inserts will be placed. It does so by puncturing them without trauma. It consists of two parts: the base, of the same size and dimensions as the insert base but constructed as a solid mass rather than in tiers, and the indicator point, a 2.2 mm. long sharpened point extending perpendicularly from the center of the base and designed to pierce the tissue for the purpose of marking it.

The trephine (Fig. 3) is a surgical instrument designed to remove a circumscribed portion of tissue.

The receptor site is that area which, after trephining, permits insertion of the insert head.

The base cutting bur is an instrument made for the dental handpiece. Its blades are shaped to cut a receptacle into the denture base of the proper size to accommodate the indicator bases and later the intramucosal inserts.

OPERATIVE PROCEDURE

Roentgenograms should be made and scrutinized with care. Foreign bodies, retained roots, and residual infections must be eliminated. Plans should be made for tentative placement of inserts. They should be spaced evenly and located at the crest of the ridge in regions of thickened mucosa. Such vital structures as incisive or greater palatine foramens, or low-dipping antrums are to be avoided.

Although complete tissue adaptation is essential, the patient's denture need not be newly constructed. Anesthesia is obtained by deposition of a minim of solution at even intervals along the ridge. After anesthetization, a sharpened millimeter probe (Fig. 4) is used to explore the ridge in order to ascertain the most likely sites for establishment of receptor sites. These sites should be marked with indelible pencil (Fig. 5, above left). Eight to ten marks should suffice, depending on the ridge size. The denture is seated causing the pencil marks to transfer to its tissue-borne surface.

At each pencil mark in the denture, the base cutting bur is used to cut a seat. Into each of these seats is placed an indicator stylus (Fig. 5, above right), and the denture is put firmly into position in the patient's mouth. Placement should be in a vertical direction. Occlusion is checked to assure the operator that the denture is in its proper position. It is then removed. Some of the indicator styluses will remain in the tissues. Those that come out with the denture leave a clearly marked puncture (Fig. 5, below left). At each of these sites the trephine is used (Fig. 5, below right); it should be forced all the way through the mucoperiosteum and turned as it is withdrawn so that the plug of mucosa will come out with it. Occasionally a problem arises in which the mucosa is not thick enough to receive the insert head. In this case it is permissible to deepen the trephined receptor site by entering the cortical plate of bone with a no. 8 round bur (Fig. 6). The newly deepened regions epithelize normally. Evidence for this was obtained from biopsies of several fully healed receptor sites prepared by the bone-deepening procedure. Laboratory reports[5] indicated normal appearing epithelial tissue. There was no sign of inflammatory change, foreign body reaction or round cell infiltration.

The large size inserts are preferable in all but the smallest mouths, but the

5. Bernheim, Alice. Personal communication.

clinician must keep each one separated by at least 1 cm. to avoid the possibility of delayed healing due to ischemia. The inserts are processed into the denture with self-curing acrylic resin using the seats formerly occupied by the indicator points (Fig. 7, left). It is of vital importance that the insert base be placed with meticulous care so that it is contiguous with the level of the tissue-borne surface of the denture. Not infrequently a too deeply recessed insert inhibits epithelization about the head since the cervix does not extend up sufficiently. This results in a shallow nonretentive receptor site after healing.

After the intramucosal inserts are welded to the denture, relieving x-shaped incisions are made at each receptor site (Fig. 7, right). The denture is snapped into position and the occlusion is checked again. The patient is dismissed with instructions regarding postoperative care. Salicylates may be prescribed for discomfort, and a soft diet is suggested to cope with transient masticatory difficulties. The patient must be informed that the prosthesis is not to be removed for ten days since this period of time is required for the tissues to readapt themselves to the shape of the insert heads. Mild oral irrigants are prescribed for interim care.

At the end of ten days, removal of the denture will be difficult. Removal can be facilitated, however, by flushing the mouth with water. Retention is ordinarily very good. The palatal acrylic resin may be resected at a later time if there is need for this operation because of gagging. If exceptional retention is not noted, several smaller size intramucosal inserts should be placed in angular positions at this time. The positions of choice for more effective grasping are in the palatal in-

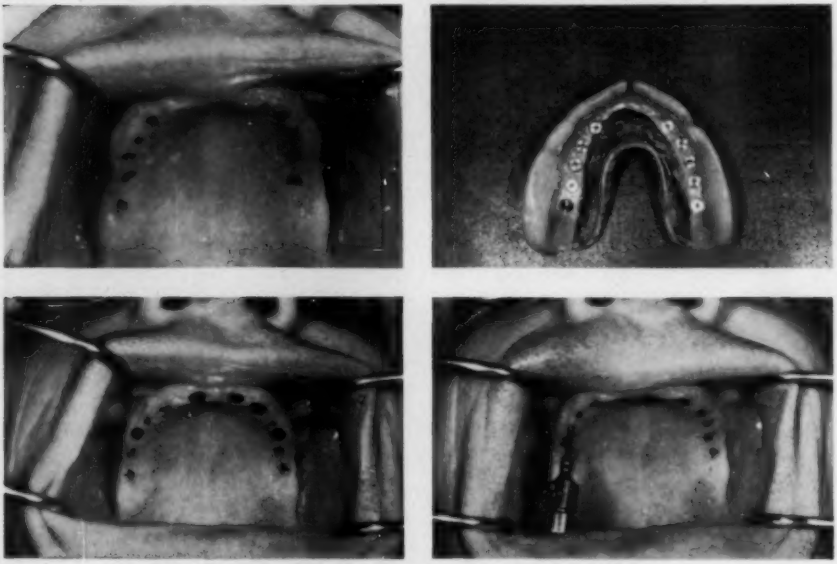

Fig. 5 • Above left: Ridge is marked with indelible pencil after probing. These marks transfer to denture after it is seated. Above right: Indicator styluses are placed in denture after base bur holes have been cut. Below left: Some styluses remain in position; others leave clearly marked points. Below right: Use of trephine

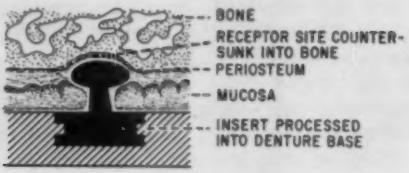

Fig. 6 • Thin mucoperiosteum requiring deepening of bone

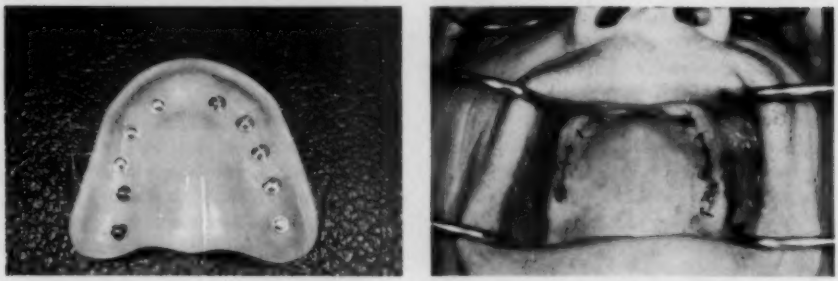

Fig. 7 • Left: Dentures with inserts. Right: X incisions at each receptor site after trephinage

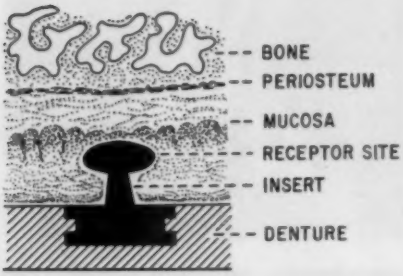

Fig. 8 • Normal condition

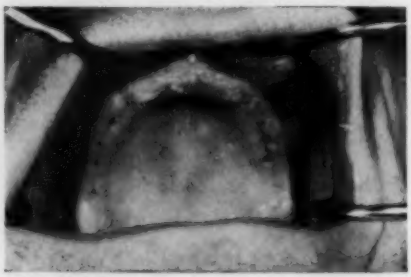

Fig. 9 • Postoperative appearance of tissues

cline[6] or in the posterior portion of the tuberosity. Since 1 cm. should separate each insert, it might be necessary to remove one or two of the originally placed devices in order to place the additional ones.

CONCLUSIONS

A technic has been developed which encourages the oral tissues to re-epithelize into a new shape. Buried or semiburied foreign bodies are not utilized; rather a method is used which induces a plastic recontouring of the mucosa around the nonreactive intramucosal insert heads. The tissues, in healing, constrict about the cervix, causing positive retention about each head (Fig. 8). After healing,

6. Lew, I., and Kestenbaum, Implant button technique for denture prosthesis. D. Digest 59:298 July 1953.

the tissues appear moist, pink, and healthy. A criterion of success is ascertained by directing the air syringe at each receptor site. It should be barely visible but should open slightly on air pressure to reveal a deep well formed crypt (Fig. 9). When the insert is placed too deeply into the denture, an improperly formed receptor site results. The remedy for this or any other persistent problem is to remove the insert, recontour the denture, and permit the tissues to fill in. After repair is completed, the insert may be replaced if need for additional retention is apparent.

After working with these retentive devices for a period of time, the operator not only becomes facile with them, but acquires talents which help him to employ them in new and original ways. They may be used in free-end saddle partial dentures when periodontally involved abutment teeth do not offer the required stability. They may also be used to assist in the stabilization of surgical prostheses and obturators. The surgical procedure is minor, the prosthetic technic simple and the results encouraging. The dentist might find the technic useful with older patients since the risk is minimal and the potential benefits gratifying.

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A method for measuring topographic changes of the maxillary residual ridge mucosa

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Many dental technics are employed in attempts to preserve the maximum of residual ridge tissue. Present-day information relative to the topographic changes of the oral mucosa during transition from alveolar to residual ridge is empiric. The purpose of this paper is to present a method which accurately and conveniently measures these changes.

Worthwhile efforts to solve this problem have been reported. Lisowski[1] utilized a modified face-bow technic in order to position casts on his Dento-contourator. Krogh-Poulsen and co-workers[2] proposed two technics for studying topographic changes: (1) they measured contour height with a depth-measuring microscope, and (2) they used contour tracings from sectioned casts. Rupp[3] mounted casts on a pantographic type of comparator to determine dimensional differences between two surfaces in the vertical direction at different points in a horizontal plane.

Evaluation of these contributions made

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1. Lisowski, C. S. Comparative study of resorption of alveolar ridge tissue under immediate dentures. Master's thesis, Northwestern University. Abstracted in Northwest.Univ.Bul. 45:11 Feb. 5, 1945.

2. Krogh-Poulsen, W. G.; Peffenbarger, G. C., and Schoonover, I. C. Two methods of graphing contour of the mucosal surface of plaster models. J.A.D.A. 36:379 April-May 1948.

3. Rupp, N. W., and others. Method for measuring mucosal surface contours of impressions, casts and dentures. J.A.D.A. 54:24 Jan. 1957.

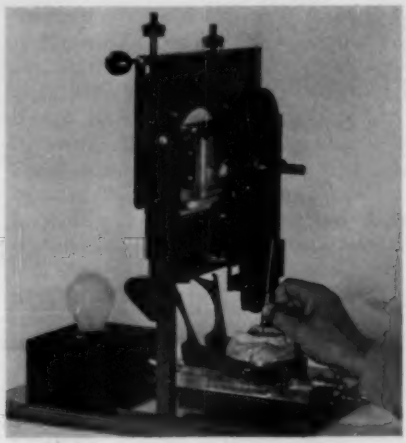

Fig. 1 • Contourator

it apparent that a method which would readily yield reproducible data for studying topographic changes as recorded by dental casts ideally should incorporate the following features:

1. An easily performed, accurate procedure for mounting successive dental casts in an identical position.

2. A means by which mounting errors can be reduced.

3. A way of expressing in terms of area the topographic changes in successive casts.

The first two requirements were fulfilled by using the Contourator, an instrument which was developed to incorporate a palatal index, pantography, and superimposition of hard palate contour tracings. Since palatal studies indicated that the surface contour of the hard palate was relatively stable, a palatal index mounting method was chosen to secure successive dental casts in an identical position.[4,5] Surface contours of dental casts were recorded by a pantographic device. Mounting errors were reduced through superimposition of the hard palate contour tracings.

The use of planimetry enabled topographic changes recorded by the Contourator to be expressed in terms of area.

DESCRIPTION OF CONTOURATOR

The Contourator is composed of a pantographic device, superimposing cassettes, an articulator, and a source of illumination (Fig. 1). The mechanism of the pantographic device and superimposing cassettes are schematically illustrated (Fig. 2). The pantographic device duplicates surface contours of dental casts on transparent paper held in the cassettes.

One of the cassettes is fixed and the other is adjustable. The fixed cassette can be removed. The adjustable cassette may be moved laterally, vertically, and in clockwise-counterclockwise directions by three control knobs.

The articulator, calibrated for movements in anteroposterior and clockwise-counterclockwise directions, is secured to the base of the Contourator.

4. Allen, L. R. Improved phonetics in artificial denture construction. Unpublished data.

5. Swenson, M. G., and Terkla, L. G. Partial dentures. St. Louis, C. V. Mosby Co., 1955, p. 238.

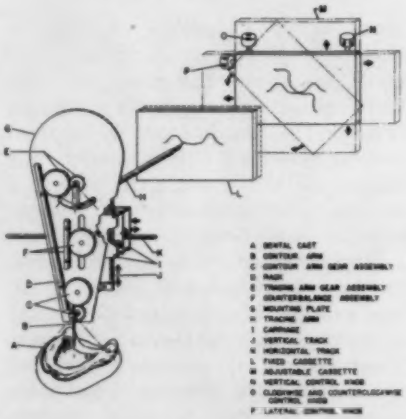

Fig. 2 • Schematic view of pantographic device and superimposing cassettes

METHOD

A maxillary impression is taken and a dental cast poured in stone. A palatal index is constructed by using only the hard palate area of this dental cast. This index (Fig. 3) is used to mount the dental cast on the articulator and to position subsequent casts. Calibrations on the articulator make it easy to locate selected areas on successive casts. As the contour arm is guided over a selected portion of the dental cast, the contour of the cast is recorded on transparent paper (see Fig. 1).

Successive casts are compared in the following manner:

1. The selected contour of the initial cast is traced on the fixed cassette. This cassette is laid aside for future reference.
2. The same contour of a subsequent cast is traced on the adjustable cassette.
3. The fixed cassette is repositioned to let the operator view the tracing of the initial cast superimposed on the tracing of the subsequent cast.
4. These two tracings are aligned in the hard palate area by moving the adjustable cassette (Fig. 4). Light from the source of illumination, diffused by an illuminating screen, facilitates this alignment.
5. The fixed cassette is again removed and the contour of the initial cast recorded on the adjustable cassette. The transparent paper in the adjustable cassette now contains the tracings of both casts.
6. Topographic changes of the maxillary residual ridge mucosa are measured with the planimeter (Fig. 5).

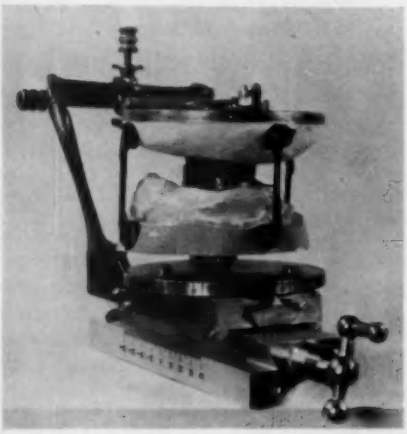

Fig. 3 • Mounting of dental cast on articulator by means of palatal index

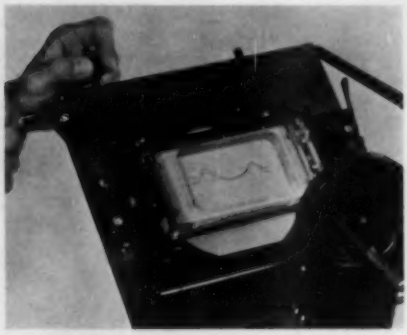

Fig. 4 • Alignment of superimposed tracings

DISCUSSION

An investigation was carried out to estimate the total variability of this procedure for measuring topographic changes. The errors in this method consist of the following: (1) impression-mounting error, (2) Contourator error, and (3) planimeter error.

A series of tracings was made from assorted geometric forms. The areas represented by these tracings were measured with the planimeter. A statistical analysis indicated that the Contourator error as well as the planimeter error were dependent on the area involved; that is, the larger the area, the greater the error. Although the areas to be measured in the course of actual investigation vary in size, depending on the nature of the experiment, a

Fig. 5 • Planimeter measurement

typical area of 3.5 sq. cm. was selected. Tracings of a geometric form 3.5 sq. cm. in area were used to determine the Contourator and planimeter errors.

In order to obtain the impression-mounting error, series of impressions were taken of patients with edentulous maxillary arches. After the resultant dental casts were mounted on the Contourator, specific contours were traced and measured with the planimeter.

The results of the statistical analysis on these three sources in this method are presented in the table.

The degree of variability can be reduced by utilizing an experienced planimeter operator, by resorting to multiple impressions, tracings, and planimeter measurements, and by employing those

Table • Statistical analysis of errors

	Estimate of average standard deviation	Average % error
Contourator	.030 sq. cm.	0.8
Impression-mounting	.050 sq. cm.	1.4
Planimeter*	.034 sq. cm.	0.9

*Variability ascertained among mean of three planimeter readings.

impression technics which afford minimal displacement of tissue.

The method described in this paper is now being used to investigate the effect of immediate versus conventional denture technic on mucosal topography, and to determine the optimum postextraction time for complete denture construction. Other potential uses for this method are to determine: (1) the effect of serial versus block extraction technic on mucosal topography; (2) the effect of alveolectomy on mucosal topography; (3) the effect of occlusal patterns of denture teeth on mucosal topography; (4) the effect of pre-extraction periodontal therapy on mucosal topography; and (5) the tissue displacement resulting from modern impression materials and technics.

SUMMARY

A method has been developed for studying changes in mucosal topography. A statistical analysis of the procedural errors in this method shows that the coefficient of variation is less than 2 per cent. This method holds promise for the investigation of other problems in clinical dentistry.

Constructing a precision attachment partial denture with an efficient and satisfactory stress-breaker

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The basic principles and fundamentals of technic and practice of the dental profession remain the same over the years; however, refinements and improvements are being made continually. Nothing original will be presented in this paper. The precision attachment type of partial denture was one of the first of the various types of removable appliances to be constructed. In this paper, however, a method by which its construction has been simplified will be presented.

It is known that through the use of precision attachments, less strain and stress is delivered to the abutment teeth, and the mucosa receives normal stimulation; thereby, a healthier and more stable dentition is created. At first, the construction of precision attachment dentures was complicated and required a number of special instruments. Because of this, the precision attachment was not accepted readily by the members of the profession as a whole. With the improvement of impression materials, with better knowledge of the materials used in constructing precision attachment partial dentures, and with physiological understanding of the hard and soft tissues of the mouth, a precision attachment partial denture is as simple to construct as the cast clasp partial denture, which can be very destructive to the abutment teeth.

The ideal of dentistry is to conserve the natural dentition and not to encourage the destruction of the teeth. This aim can be better achieved by using precision attachment partial dentures. John Oppie McCall,[1] an outstanding periodontist, said: "I am of the opinion that the partial denture retained by the internal or so called precision attachment is the most nearly ideal appliance." McCall's statement being true, then why is this type of partial denture not stressed in institutions of dental education? Students are required to construct a number of cast clasp partial dentures, but rarely required to construct any precision attachment ones. In regard to this situation, Dressel[2] has said: "A more widespread knowledge and application of precision bridgework should be the responsibility of our institutions for dental training." He also has said:

> Despite strong thinking in some quarters to the contrary, it is my opinion that a preclinical course in crown and bridge restorative work which does not include a project in precision bridgework cannot be considered as one which is comprehensive and well balanced. Omission of the project deprives the undergraduate student of that which he has the right to expect. He should also be given an opportunity to view clinically the practical application of his preclinical training in this work.

Presented before the American Academy of Crown and Bridge Prosthodontics, Chicago, February 1, 1958.

1. McCall, J. O. Periodontist looks at clasp partial denture. J.A.D.A. 43:439 Oct. 1951.

2. Dressel, R. P. Precision attachments and their practical application. North-West Den. 32:7 Jan. 1953.

Fig. 1 • Master cast showing preparation of two full crowns and one pinledge as abutments

DIAGNOSIS

Correct diagnosis determines whether there will be success or failure in the construction of a precision appliance. By the use of a complete set of excellent roentgenograms of the mouth and an accurate set of study casts, together with a history of the patient, it is possible to arrive at a diagnosis. The operator should consider the following points: the length of the roots and crowns of the teeth, the density of the supporting bone structure and saddle regions, the angulation of the teeth, the mobility of the teeth, and the reason for the loss of the missing teeth. The study casts should be mounted on an adaptable instrument, the occlusion studied and the casts surveyed to determine the amount of tooth structure to be removed to parallel the abutments. Before the dentist begins the cavity preparations, the remaining teeth should be checked for possible trauma. If any exists, the condition should be corrected.

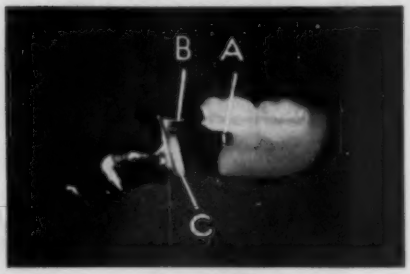

Fig. 2 • Free end saddle is attached to bar by a small screw creating the broken stress in function. A: screw; B: shafting with hole; C: bevel on bar

OPERATIVE AND LABORATORY PROCEDURE

The cavity preparation in the abutments should be parallel, as nearly as the eye can determine, with a slight inset or box preparation on the surface of the tooth in which the attachment is to be placed. Full coverage castings are by far the most satisfactory abutments; however, three quarter crown castings can be used in many instances, and MOD inlay castings sometimes can be considered. Rarely is it safe to use MO or DO restorations for retainers. On the anterior teeth, pinledge castings can be used with safety, provided the dowels are heavier and longer than ordinarily used for single restorations (Fig. 1).

Fig. 3 • Waxing of abutments on master cast using parallelometer with correct size of attachment mandrels to form the boxings to accommodate the female portion of attachment

In partial dentures with free end saddles, a distal extension stress-breaker is used which permits the substitute teeth on the free end saddle to function independently and without torque or strain on any of the abutment teeth. This type of stress-breaker is not controlled by any indirect springs, but by the occlusion

(Fig. 2). It has lateral and vertical movement during mastication and returns to its rest position when the teeth are in centric occlusion. The stress-breaking action does not involve the whole denture, but only those substitute teeth on the individual saddle. If the denture has a free end saddle bilaterally, a stress-breaker is constructed for both saddles.

After the abutments are prepared, a full hydrocolloid impression is taken for a master cast on which the denture will be completed. The abutment teeth on the master cast are not keyed or separated from the cast at any time for any reason. Individual hydrocolloid impressions are taken of the abutments to be used for refining the wax patterns.

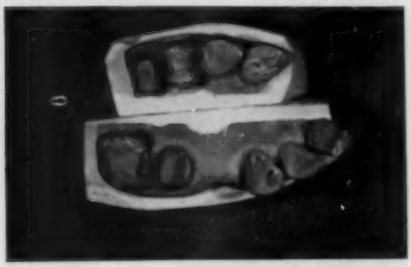

Fig. 4 • Individual dies to refine and correct the gingival margins of wax patterns carved to occlusion on master cast

An accurate bite impression is taken, and the master cast and the opposing cast are mounted on an adaptable instrument. The patterns are waxed on the abutment teeth; a parallelometer is used (Fig. 3) which has the correct size attachment mandrels to form the boxing in the patterns for the purpose of accommodating the female portions of the attachment. After the wax patterns are carved to occlusion, they are transferred from the master cast to their respective individual dies (Fig. 4) for correction of the gingival margins and general refinement before being invested for casting.

Fig. 5 • Female portion of attachment waxed in abutment with carbon point inserted ready to invest to solder to abutment

The castings are fitted to the individual dies and the margins finished, after which they are carried to the master cast. After the occlusion is corrected, the female portion of the attachment is waxed in position (Fig. 5). A parallelometer is utilized that has attachment mandrels carrying the same size attachments. Best success is obtained if the two female portions of the attachments for the abutments on the opposite sides of the mouth are paralleled and waxed in position (Fig. 6). One of these retainers is removed and invested with a trench in the investment (Fig. 7). The trench runs from buccal to lingual and assures that the female portion of the attachment is completely soldered to the retainer when solder appears in both of these grooves.

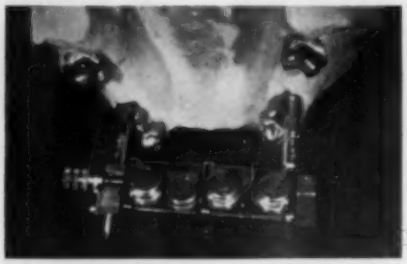

Fig. 6 • Parallelometer with attachment mandrels carrying the female portion of the attachment in order to wax these in abutments. Note abutments on opposite sides of arch are paralleled first

Fig. 7 • Female portion of attachment waxed to abutment and invested. Note grooves on both sides for solder to flow through

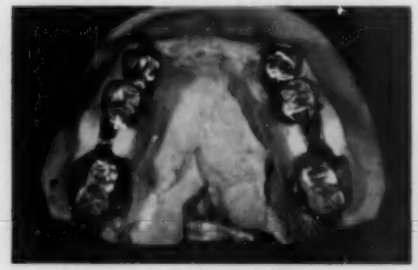

Fig. 8 • Male portion of attachments waxed in position in abutments ready to take a hydrocolloid impression to produce an investment cast

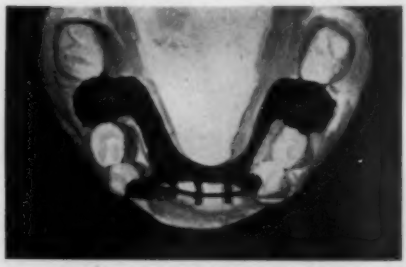

Fig. 9 • Bar and skeleton waxed on investment cast ready for casting

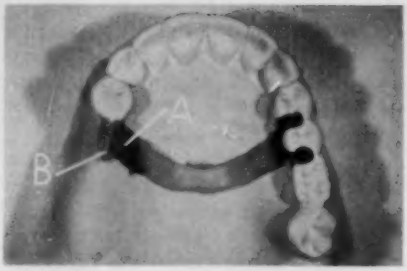

Fig. 10 • Palatal bar waxed for casting beveled where free end saddle attaches, with quarter of an inch of shafting with solder flowed on one end waxed parallel to ridge. A: bevel on bar; B: ¼ inch shafting

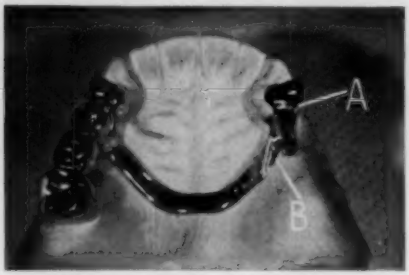

Fig. 11 • Palatal bar cast fitted to master cast with male portion of attachment waxed to bar ready to invest and solder. A: male portion of attachment; B: bevel on bar

Fig. 12 • Bar with male attachment soldered in position on master cast

Fig. 13 • Precision casing with tubing soldered on lingual aspect. A: precision casing; B: tubing

Fig. 14 • Free end saddle with stress-breaker waxed in position. A: free end saddle; B: stress-breaker

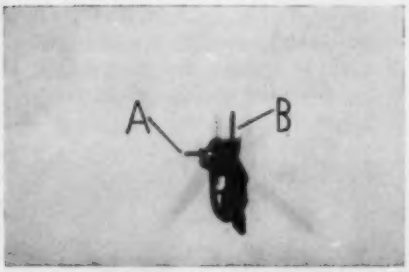

Fig. 15 • Wax pattern of free end saddle with stress-breaker ready to invest with carbon points in tubing and casing. A: carbon point in tubing; B: carbon point in casing

Fig. 16 • Free end saddle fitted in place on bar on master cast

Fig. 17 • Making hole in shafting through which screw will pass which holds free end saddle in place. Note that hole must be larger than screw

Fig. 18 • Threading tubing with an 080 tap to accommodate the screw which will retain the free end saddle

Fig. 19 • Thin mix of plaster painted between distal extension saddle and bar to prevent plastic from entering in attaching the teeth. A: plaster on bar; A^1: Plaster on distal extension saddle

After the female portion of the attachment is soldered, the abutment is carried to the master cast and the female attachment is ground to the occlusion. One retainer at a time is soldered and ground to occlusion until all retainers on the denture are soldered. The male attachments are fitted to their respective abutments and waxed in position (Fig. 8). A duplicate hydrocolloid impression is taken, and an investment cast is poured on which the bar is waxed (Fig. 9), with fingers contacting the contact plate of the male attachment.

For a free end saddle, the bar is waxed and beveled where it will join the free end saddle. A fourth of an inch of shafting, on the end of which has been placed a small amount of solder, is waxed in position parallel to the ridge (Fig. 10). The bar is cast and fitted into position on the master cast. Each male attachment is soldered separately (Fig. 11) and the bar is carried back to the master cast after each soldering operation to be certain of its accuracy.

THE STRESS-BREAKER

After all the male attachments are soldered to the bar and the bar fitted in such a way that the attachments are seated readily and removed with ease (Fig. 12), the remaining portion of the distal extension stress-breaker is constructed. More solder is flowed around the end of the shafting, and a piece of precision casing is fitted over the shafting. A piece of tubing long enough to extend through to the lingual surface of the saddle is soldered at the center of the casing (Fig. 13). A hole is drilled through the casing where the tube is soldered to allow the investment to enter the tube and casing.

The free end saddle which is to accommodate the substitute teeth and the distal extension stress-breaker assembly is waxed in position (Fig. 14). The wax pattern is removed from the master cast, carbon points are inserted in both the casing and the tubing (Fig. 15), and the pattern is invested. After casting and finishing the free end saddle, it is carried back to the master cast to fit the saddle to the bar accurately (Fig. 16). After the distal extension saddle is in place and an end cutting bur inserted through the tubing, a mark is made on the shafting to indicate the position for the hole which must extend through the shafting. The hole must be larger than the screw which will eventually hold the saddle in position. The distal extension saddle is removed, the hole completed and the saddle is replaced in position (Fig. 17). The tubing is threaded (Fig. 18) with an 080 tap in order to accommodate the screw which is made by using a die plate with a 15 gauge gold wire. A thin mix of plaster is

Fig. 20 • Thin mix of plaster from gingival to occlusal aspects where bar joins attachment to prevent plastic from entering

painted between the bar and the distal extension saddle, and the bar with the distal extension saddle in place is returned to the cast (Fig. 19). Another thin mix of plaster is painted from the occlusal to the gingival aspects where the attachment on the bar joins the abutment (Fig. 20). The purpose of the plaster is to seal out any plastic while the teeth are being attached. The denture is invested by holding the bar and the abutments on the cast.

SUMMARY

A technic has been developed which is simple and results in an appliance that is passive, which means, according to Neurohr,[3] "that it must not pull or press upon either the hard or soft tissues of the mouth when masticatory pressure is released." To construct a passive appliance, the impressions must be taken without tissue displacement. The appliance should be stimulating to the hard and soft tissues of the mouth. The stress-breaker is controlled according to the amount and direction of movement by the grinding of the shafting of the distal extension. Since it functions with the occlusion, it cannot be destructive to the abutment teeth.

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3. Neurohr, F. G. Health conservation of periodontal tissues by method of functional partial denture design. J.A.D.A. 31:58 Jan. 1944.

The prosthetic speech appliance in rehabilitation of patients with cleft palate

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A cleft palate might be defined as a fissure located in the palate and completely surrounded by a human being. This definition emphasizes the goal of the Northwestern University Cleft Lip and Palate Institute; namely, the rehabilitation of the human being born with the cleft palate deformity. Many years of experience in this work at the Institute have shown that this goal is seldom reached by simply closing the defect through surgery or plugging up the defect through prosthetics. However, the experience of treating over 1,000 persons with cleft palate has established beyond any doubt the importance of the prosthetic speech appliance in the total treatment plan of many patients.

Unfortunately, much misunderstanding and misinterpretation of the purpose and the limitations of the speech aid still exist, even among medical and dental specialists. A clear, step-by-step procedure for the construction and testing of the modern-type appliance is lacking in the current literature. The present paper is presented to meet this need. It will consider in turn: (1) the purpose of the appliance as a functional part of

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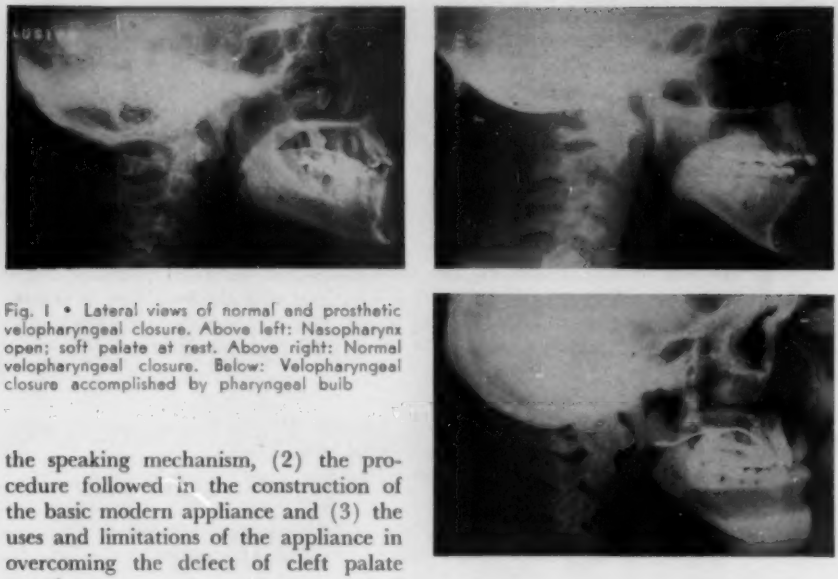

Fig. 1 • Lateral views of normal and prosthetic velopharyngeal closure. Above left: Nasopharynx open; soft palate at rest. Above right: Normal velopharyngeal closure. Below: Velopharyngeal closure accomplished by pharyngeal bulb

the speaking mechanism, (2) the procedure followed in the construction of the basic modern appliance and (3) the uses and limitations of the appliance in overcoming the defect of cleft palate speech.

PURPOSE OF A SPEECH APPLIANCE

The basic purpose of the prosthetic speech appliance is twofold: first, to restore the physical division between the oral and nasal cavities normally accomplished by the intact hard and soft palates, and, second, to make possible the recurrent closing and opening of the nasopharynx normally accomplished by the complex velopharyngeal function (Fig. 1, above right).

Fig. 2 • Typical present day speech appliance

Although the speech aid is designed to be a substitute for the cleft portion of the palate, the modern appliance is not designed to be a substitute palate. No attempt through the use of hinges or movable parts is made to duplicate the velopharyngeal valving of the musculofibrous soft palate shown in Figure 1, above left and right.

Rather as indicated in Figure 1, below, the rigid extended posterior section of the appliance is positioned high in the region of the nasopharynx where it is finely adjusted in size and shape so as to act as a semi-obturator of this region.

The complete speech appliance is shown in Figure 2. The body portion attaches to the teeth of the maxillary arch and covers the hard palate on the oral surface. Any remaining cleft of the hard palate or any perforation in this structure is completely obturated by the body section.

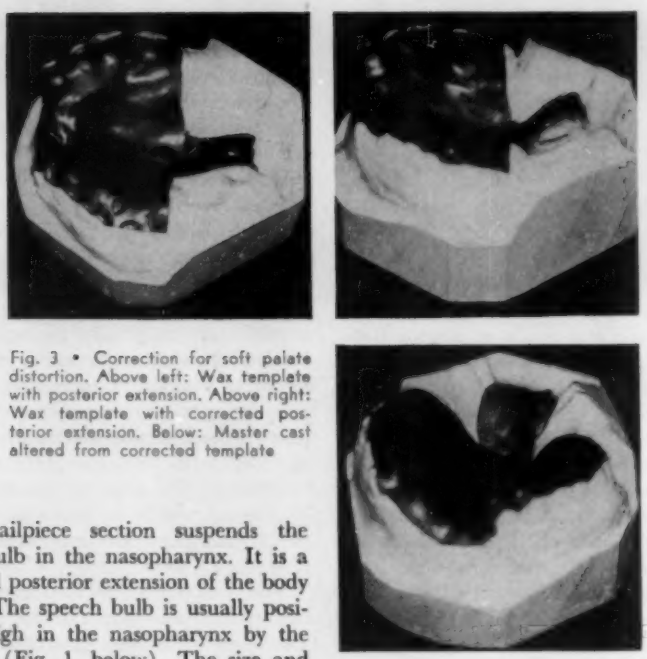

Fig. 3 • Correction for soft palate distortion. Above left: Wax template with posterior extension. Above right: Wax template with corrected posterior extension. Below: Master cast altered from corrected template

The tailpiece section suspends the speech bulb in the nasopharynx. It is a narrowed posterior extension of the body section. The speech bulb is usually positioned high in the nasopharynx by the tailpiece (Fig. 1, below). The size and shape of the speech bulb is adjusted to conform to the anatomy and physiology of each individual so as to allow air to pass freely through the nasopharyngeal port for breathing and yet to make possible the closure of this airway space for speech. The greatest portion of the muscular valving against the speech bulb is accounted for by the medial movement of the lateral walls of the nasopharynx. The muscle action of the pharyngeal constrictor, sphincter-complex, and salpingopharyngeus muscles against the stable speech bulb accomplishes this closure for speech.

This same muscle activity is utilized in the construction of the speech appliance.

CONSTRUCTION OF APPLIANCE

The construction of a speech appliance begins with the prosthodontist's making a study model of the mouth, duplicating all the structures possible, from an alginate impression. The cast is surveyed for reliefs and rests for the metal framework, and the general configuration of the defect is observed. After the proper reliefs and rests have been completed, a tray is fitted to the palatal arch and a second final alginate impression of the mouth is made and poured up. This final cast usually will show the nasal conchae and at times part of the vomer.

Distortion of the impression of the soft palate on the model, caused by displacement of the soft tissues, may be corrected, as described by Wensink,[1] by adapting a single thickness of fairly hard baseplate wax to the hard palate surface of the cast and running a posterior extension of this wax on the soft palate area of the cast (Fig. 3, above left). This wax

1. Wensink, R. A. Construction of prosthetic appliances for the cleft palate patient. Oregon D. J. 24:2 March 1955.

template is carried to the mouth where its proper adaptation and length is checked visually. The patient is then asked to close his mouth and bite. If there is any deviation from rest position of the soft palate, the mouth temperature will soften the posterior extension of the wax template and it will readapt itself at the correct height of the soft palate. The wax template is chilled and placed back on the master model (Fig. 3, above right). The master cast is altered to give correct soft palate length and height by flowing stone or plaster under the wax tailpiece of the template (Fig. 3, below). (This is demonstrated by red modeling compound.)

The cast is then outlined for the metal work, which is constructed and placed back on the cast to be checked for accuracy. The body of the appliance is the retentive portion covering the hard palate. The tailpiece connects the body to the bulb and reaches posteriorly to the anterior border of the cleft area in the soft palate (Fig. 4). The width of the tailpiece varies according to existing conditions. It, as well as the body of the appliance, should be cast as thin and light as possible, consistent with the size of the appliance.

The impression for the bulb is developed by placing a triangular-shaped form of low-fusing modeling compound on the loop or retentive agent, at the end of the tailpiece, and carrying the entire unit to the mouth. The metal work is seated and the patient is instructed to bend the head forward on the chest. The modeling compound impression is chilled and the appliance is removed. The imprint of the posterior wall of the pharynx, together with the indentation of the tubercle of the atlas or possibly Passavant's pad, will be in evidence. Figure 5 shows the posterior extension of the pharyngeal bulb.

The compound bulb is again softened, carried to the mouth, and the patient is instructed to swallow. The bulb is chilled, removed and observed. If visual inspection shows the bulb to be overextended or underextended, these steps should be repeated, by knife trimming or adding compound as deemed necessary, until the bulb is muscle-trimmed laterally.

Recent research studies by Anderson[2] and Norstrom[3] have shown that both the palatal and pharyngeal muscle activity of persons with cleft palate is considerably greater during swallowing than during phonation; consequently, the resultant muscle-trimmed compound bulb is usually somewhat underextended for a fine speech adjustment. Therefore, the prosthodontist should not overemphasize the swallowing procedure in constructing and adjusting the bulb.

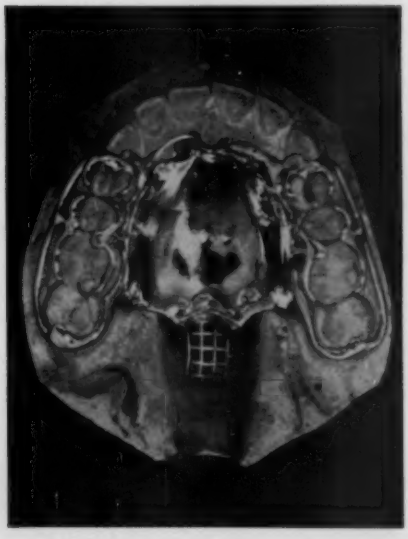

Fig. 4 • Metal framework in place on master cast

2. Anderson, Barrett. Functional radiographic investigation of the nasal and oral pharyngeal structures during deglutition in cleft palate individuals. M. S. thesis, Northwestern University Dental School, 1957.

3. Norstrom, Pirkko. Functional cephalometric radiographic investigation of the nasal and oral pharyngeal structures during deglutition in non-cleft palate individuals. M. S. thesis, Northwestern University Dental School, 1957.

Underextension is corrected by applying softer fusing compound to the distolateral corners of the compound bulb, softening the material, and carrying it to the mouth. The unit is seated, and the patient is instructed to turn the head from side to side. These movements and steps are repeated until perfect adaptation is obtained. If some difficulty is encountered while carrying out this last step, the entire procedure can be repeated with still a lower fusing thermoplastic wax such as Iowa Wax.

After a satisfactory compound impression of the defect is obtained, a plaster mold is made preserving the relationship of the bulb to the palatal portion of the appliance (Fig. 6, above left). The impression material is then softened with heat and removed from the plaster mold, and separating material is placed in the core (Fig. 6, above right). Self-curing acrylic resin is then painted or inserted into the plaster impression of the compound bulb and allowed to polymerize (Fig. 6, below left). After the curing is complete, the acrylic bulb is finished and trimmed with acrylic burs and polishing agents (Fig. 6, below right).

The technic for speech appliance construction, as described, allows the muscles which are to accomplish velopharyngeal valving with the pharyngeal bulb to determine the actual size and shape of the extended speech bulb. Figure 1, below, illustrates the position of the speech bulb in relation to the surrounding musculature. In step 1 of the procedure, the posterior margin of the compound bulb is trimmed by its contact with the superior pharyngeal constrictor muscle on the posterior wall of the nasopharynx. During the swallowing muscle-trim, the entire bulb is shaped further by the action of the superior pharyngeal constrictor muscle, including the sphincter ring, the levator and tensor muscles of the palate, the stripping motion of the posterior pillars and the medial movement of the salpingopharyngeus muscle.

Fig. 5 • Posterior surface of preliminary bulb

The inferior surface of the impression for the pharyngeal bulb is muscle-trimmed by the backward and upward action of the tongue.

The bulb impression is contoured superiorly, high enough into the nasopharynx to allow continual contact with the palatal tags when the soft palate rises and falls during the act of swallowing. Excessive height is cautioned against as it frequently results in hyponasality.

USES AND LIMITATIONS OF THE SPEECH APPLIANCE

Hypernasality (or nasal twang) is the subjective impression the speaker's voice makes on a listener when an excessive amount of overtone resonance occurs in the nasal chambers. A speech appliance, of itself, can eliminate hypernasal voice quality and, if carefully adjusted, can eliminate the distortion of consonant sound elements due to audible nasal emission; but it cannot, of itself, correct any habits of misarticulation the patient may possess.

Voice quality can be altered mechanically to the extreme of hyponasality (insufficient overtone resonance in the nasal chambers) by enlarging the size of the speech bulb. A fine adjustment of the size of the speech bulb will make possible a pleasing voice quality. It will also eliminate the distortion of certain pressure sound elements, such as p, b, f, s, ch and

j sounds, due to audible puffs of air rushing through the nose at the instant of their articulation. If the bulb is adjusted by the prosthodontist to the point where the user can produce a clear p and a sustained f or s sound without emission of air through the nose and also can produce the nasal sound m, the appliance is adjusted adequately. (The s sound gives a finer test of nasal emission than the f, but should not be used if it is not made in a normal fashion by the patient.)

From this point on the elimination of the remaining speech differences will depend on the motivation and cooperation of the subject in overcoming habits of misarticulation. These habits are learned and reinforced from early childhood. Relearning therefore usually can be accomplished best by working with a skilled speech correction teacher. Under favorable conditions, that is, with an intelligent and motivated patient and a well-adjusted speech appliance, the prognosis for normal speech is very good even for

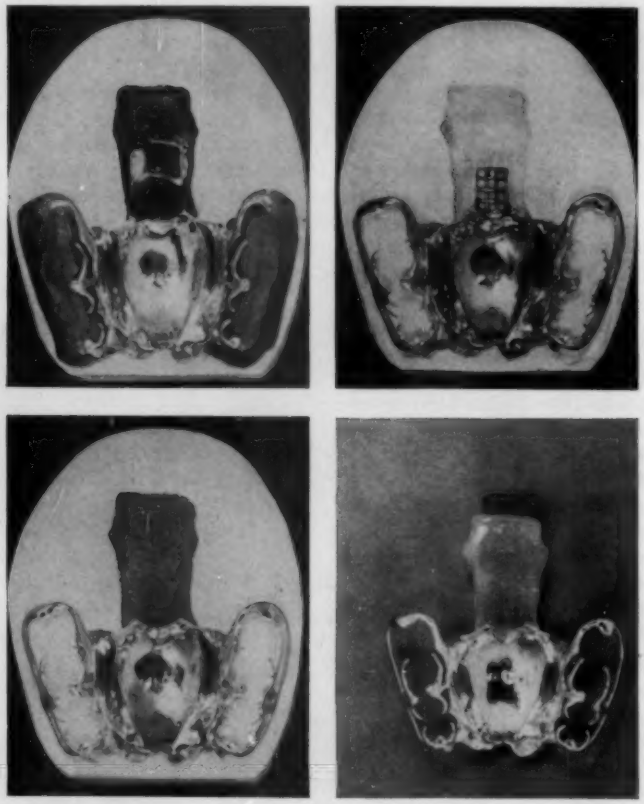

Fig. 6 • Construction of acrylic pharyngeal section from compound impression. Above left: Metalwork and attached compound bulb invested in plaster. Above right: Compound pharyngeal section removed. Below left: Mold filled with self-curing acrylic resin. Below right: Pharyngeal section complete

adolescent and adult persons with cleft palate.

Certain cautions must be emphasized in regard to the prosthetic speech appliance. If not properly managed by the prosthodontist the appliance could result in: (1) disappointment on the part of the patient over less-intelligible speech with the appliance; (2) a possible threat to dental-oral health; (3) a causal factor in the development of mouth breathing; (4) a threat to the preservation and stabilization of the maxillary dentition, and (5) disturbance of the normal drainage through the nasal pharynx which could result in otological complications.

To a great extent, the speech of persons with cleft palate is deficient on a functional or habitual basis. In a recent detailed analysis of the speech of preschool children, Bzoch[4] found that the habit of articulating consonant sounds in the larynx and oral pharynx was typical of children with cleft palate and atypical of similar normal children. Related studies by Starr[5] and Counihan[6] showed that these substitute articulations diminished with age but continued to be a considerable factor in the speech defect.

It is this characteristic functional defect in the speech of persons with a cleft palate which the speech appliance *per se* will not improve. Often, these unusual articulation habits are not perceived by the patient or his family because of the gross distortion of speech through hypernasality and nasal emission. When the speech appliance eliminates these two factors of the speech defect, the misarticulations may become perceivable for the first time. The temporary result may be a period of less intelligent speech. The patient and his parents should be prepared for this possibility, and it should be explained that only with the appliance and speech training can these habits be changed.

It is obvious that a patient must have, or be willing to acquire, good habits of oral hygiene if they are to wear a speech appliance. The appliance is relatively larger than the more common dental prosthesis and has more irregular surfaces. Also, it frequently will be worn by younger patients who need supervision and persuasion from their parents even for routine toothbrushing. If the importance of good oral hygiene is strongly emphasized to both the patient and (if a child) his parents, no problem need arise. A clear procedure should be outlined by the prosthodontist for care and cleaning of the appliance, and the motivation actually can be utilized to improve or establish good habits of oral hygiene.

Sometimes the speech bulb is made too large, or after it has been properly adjusted allergic or infectious conditions cause a swelling of the surrounding membranes. Significant muscular development sometimes takes place after the placement of the appliance (due to the increased activity of the muscles against the resistance of the speech bulb). Any of these conditions could lead to complete obturation of the nasopharynx. This might cause mouth breathing habits to form or otological complications. The condition can be corrected easily by adjusting the speech bulb. Some system of voluntary or routine re-examinations should be instituted therefore to guard against such occurrences. Such re-examinations are also important to assess the need for enlargements and adjustments of the bulb after periods of growth.

Finally, it should be cautioned that a speech appliance, if not properly adjusted and retained, could act as a reverse orthodontic appliance. The muscle action of the velum and pharynx could transmit

4. Bzoch, Kenneth R. Investigation of the speech of pre-school cleft palate children. Ph.D. thesis, Northwestern University School of Speech, 1956.

5. Starr, Clark. Study of some of the characteristics of the speech and speech mechanism of a group of cleft palate children. Ph.D. thesis, Northwestern University School of Speech, 1956.

6. Counihan, D. R. Clinical study of the speech efficiency and structural adequacy of operated adolescent and adult cleft palate persons. Ph.D. thesis, Northwestern University School of Speech, 1956.

intermittent pressure to the teeth causing them to tilt or shift and thereby affect the occlusion. Proper retention and adjustment eliminates this hazard.

The prosthetic speech appliance can be, and often is for many human beings, the key by which the door of normal life is opened. When the tissue is insufficient for successful surgical closure, prosthetics becomes the rehabilitation method of choice. When surgery is to be postponed through speech readiness and development periods, a temporary speech appliance makes possible the acquisition of acceptable and even normal speech habits. For many adults who have cleft palate and deficient maxillary development, the speech appliance combined with an anterior splint and denture plus the skill of the plastic surgeon in adjusting the upper lip and nasal structures may bring, for the first time in their lives, normal speech, normal eating and normal appearance.

Prosthetic restorations associated with abnormal jaw relations

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Maxillomandibular relations which involve deviations from the normal occur with considerable frequency and often are associated with challenging diagnostic and treatment problems. These abnormal conditions may occur in such gross form as to be obvious immediately, or they may be so subtle that they defy detection against all but the closest scrutiny. Similarly, physiologic reaction to the abnormalities may range from complete absence of symptoms, to conditions of such severity that pathologic conditions of the oral structures or temporomandibular joint are demonstrable.

Among the direct reactions attributed to the malrelationships are retrograde periodontal processes and displacement of the condyles within the fossae. The latter condition has been claimed to produce such symptoms as tenderness, crepitus, clicking, subluxation, pain, tinnitus and dizziness. Muscle tensions, deafness and various reflex responses throughout the body are also said to result.

Regardless of the nature or magnitude of the abnormality, all treatment procedures are based on the same fundamental considerations of anatomy, physiology and other sciences related to the chewing mechanism. Although many abnormal jaw relationship problems are treated successfully by general operative dentistry procedures, some require treatment within the specialties of dentistry. For instance, certain conditions which involve periodontal pathologic changes, associated with traumatogenic occlusal disharmonies, are treated best by the

The opinions or assertions herein are those of the author and are not to be construed as official or as reflecting the views of the Navy Department or the naval service at large.

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Captain, Dental Corps, U. S. Navy. Head of professional branch, dental division, Bureau of Medicine and Surgery, Navy Department.

periodontist. Or, when changes in tooth positions are indicated, the orthodontist renders treatment most effectively. Occasionally, the correction of gross abnormalities may demand the talents of the oral surgeon. This paper will discuss certain of the situations which are of special concern in the field of prosthodontics.

Many of these jaw relationship problems fall into such well-defined groups that diagnosis and treatment planning can be somewhat standardized, provided the "normal" is understood and the "abnormal" is recognized. Fortunately, much valuable work has been reported in this field to assist in evaluation and solution of the problems encountered.

Monson[1] felt that impaired hearing resulted from pressure caused by the upward and backward thrust of the mandible following loss of vertical dimension, and pointed out the advantages of so-called "bite-raising" procedures in preventing this displacement. He directed attention to the necessity for analysis and adjustment of the occlusion before treatment was undertaken. Costen[2] also reported numerous cases in which he considered loss of vertical dimension or lack of posterior occlusion to be the causes of the previously enumerated symptoms of discomfort, pain or pathology which are commonly referred to as the Costen's syndrome. He found that these symptoms were relieved or eliminated when necessary occlusal support was renewed and proper articulation of the condyles was established.

Two related factors which are so important that they are considered basic in all correction and rehabilitation procedures were reported by Niswonger.[3] He provided the knowledge that there is a relatively constant rest position of the mandible which determines the length of the face regardless of the presence or absence of teeth. He also reported the consistent presence of an interocclusal or freeway space when the jaw is at rest. The relative constancy of the rest position permits its use for reference in arriving at dimensions pertaining to occlusion in the same manner as sea level is used for determinations related to altitude.

The report of Costen's work started an era of treatments which sought to relieve all manner of ailments about the head and neck through modifications in the occlusion or changes in mandibular position. Many of the results were disappointing or unsuccessful because treatment was either ill-conceived or undertaken without due regard for the temporomandibular joint, musculature and periodontium. The associated hazards were soon recognized by Niswonger,[3] Mershon,[4] Tench,[5] Schuyler[6] and others who were unanimous in cautioning against the pursuit of bite opening or jaw repositioning procedures without complete understanding of both the beneficial and adverse results which might follow.

The basic requirements for treatment are so simple in principle that their individual and interrelated importance could be overlooked. These requirements were set forth capably by Schuyler[6] as follows: ". . . determine the degree of opening or change that will be tolerated in the individual case . . . . obtain an innocuous centric maxillomandibular relation at the desired opening, . . . [and rebuild] occluding surfaces." To this he added the stipulation that opposing occlusal incline planes must be developed in harmony with jaw movements. The

1. Monson, G. S. Occlusion as applied to crown and bridgework. J.A.D.A. 7:399 May 1920.

2. Costen, J. B. Neuralgias and ear symptoms associated with disturbed function of the temporomandibular joint. J.A.M.A. 107:252 July 25, 1936.

3. Niswonger, M. E. Rest position of the mandible and the centric relation. J.A.D.A. 21:1572 Sept. 1934.

4. Mershon, J. V. Possibilities and limitations in the treatment of closed-bites. Orthodont. & Oral Surg. Internat. J. 23:581 June 1937.

5. Tench, R. W. Dangers in dental reconstruction involving increase of the vertical dimension of the lower third of the human face. (Opening the bite.) J.A.D.A. 25:566 April 1938.

6. Schuyler, C. H. Problems associated with opening of the bite which would contraindicate it as a common procedure. J.A.D.A. 26:734 May 1939.

background philosophies of each of the steps involved have been elaborated sufficiently in the literature so that they will not be repeated here, but their applicability to practical cases will be discussed.

I have observed that, although countless abnormal situations occur, a high percentage of the conditions which the prosthodontist is called on to treat fall into four groups which show the following typical relationships:

1. Upward and backward displacement of the condyles due to cuspal disharmonies or loss of posterior tooth support.

2. Acquired mandibular prognathism, usually with overclosure and such poor occlusion that there is no proper interdigitation of the posterior teeth.

3. Deep anterior overbite due to overeruption of the anterior teeth.

4. Deep anterior overbite due to undereruption of the posterior teeth.

Various combinations of these conditions may occur, and each may be associated with some degree of lateral displacement. Unusual situations are encountered occasionally, such as anterior and lateral displacement on one side, with posterior and lateral displacement on the opposite side.

In all instances the condition should be analyzed in the manner suggested by Thompson and Craddock.[7] Their method, with minor changes, is outlined briefly as follows:

1. Unstrained closure of the mandible from rest position to first contact and then to full closure is observed. Any anterior, posterior, or lateral movement of the mandible which occurs in passing from initial contact to habitual occlusion is indicative of displacement, not present in the normal where all teeth occlude simultaneously. Superimposed temporomandibular joint roentgenograms may be of additional value in detecting significant displacement of the condyles.

2. The condyles are palpated and muscle action is observed as the patient performs chewing movements and brings the teeth into occlusion. Any limitation or abnormality of movement, deflection of the mandible on closure, or clicking and crepitation of the joint is noted.

3. In certain instances, it may be advantageous to observe study casts in an anatomic articulator to make a further appraisal of the occlusion. For this purpose, an articulator which permits retrusive movements is most desirable. The upper cast is mounted with the aid of a facebow record, and the lower is mounted to a wax or plaster record of the centric position of the mandible. The index for the lower mounting is made at a point just before the teeth come into contact—rather than with them in occlusion, because contacting cuspal inclines might deflect the mandible from centric relation. Closure of the articulator then reveals either simultaneous contact of all teeth in centric occlusion or cuspal disharmonies with possible mandibular displacement.

4. The amount of freeway space present is determined. This is, of course, the difference between the vertical dimension of rest and the vertical dimension of occlusion, usually measured in the midline between two points on the face, or on profile roentgenograms.

5. On the basis of the amount of freeway space, a distinction should be made between a deep overbite which is due to overeruption of the anterior teeth and one which is due to undereruption of the posterior teeth. The former usually shows minimal to average freeway space, whereas the latter shows considerably more than average separation of the teeth when the jaw is at rest.

On the first visit of the patient, it may be difficult, if not impossible, to obtain a physiologically accurate registration of centric relation or to determine the true rest position of the mandible.

7. Thompson, J. R., and Craddock, F. W. Functional analysis of occlusion. J.A.D.A. 39:404 Oct. 1949.

This may be due to tensions of the patient, abnormal muscle tonicity, inflammation, or distortion of the tissues within the joint. These conditions usually respond favorably within a few days to the use of hot packs on the affected side of the face, soft diet, mild exercise and light sedation. However, it may be necessary to make preliminary occlusal adjustments or to place temporary splints prior to the recording of maxillomandibular relations. The splints, which are constructed of metal or plastic, may be placed on either the maxillary or mandibular teeth. The occluding surface of the splint is made relatively flat to eliminate cuspal influences, thereby permitting the mandible to assume its normal position.

REPORT OF CASES

Each of the case reports which follows discusses a classic example of the four malrelation situations previously enumerated. The factors involved in analysis and treatment planning are basic, and are applicable to other situations which are similar individually, or as composites of those reported.

Case 1 • In this patient, loss of posterior tooth support and drifting of teeth resulted in occlusal disharmonies and a temporomandibular joint problem such as is often associated with upward and backward displacement of the condyle.

The patient had experienced pressure, habitual clicking, snapping and pain in the left temporomandibular joint for seven years. A previous attempt to eliminate the symptoms through placement of a mandibular partial denture did not provide the desired relief.

Examination • All teeth were in position except the upper right first molar, the lower right first molar, the upper left first bicuspid, and all molars of the lower left side (Fig. 1, above). Sufficient drifting of the teeth had occurred to close the upper bicuspid and molar spaces, but, because of improper interdigitation of the teeth, numerous occlusal disharmonies resulted. Analysis of the natural teeth and of casts mounted in an articulator showed that partial correction of the cuspal interferences had been made through abrasion. However, as the mandible passed from initial tooth contact to full closure, interfering cuspal inclines caused the mandible to rotate to the left, carrying the left side into a posteriorly displaced position. When the patient opened the jaws from this position, the clicking which he experienced could usually be palpated and heard.

Approximately 3.5 mm. of freeway space existed when the mandible was at rest. This was considered normal for the patient, so no change in the vertical dimension of occlusion was indicated.

Examination of the original partial denture revealed that it had been well planned and fabricated from a technical standpoint, but that its occlusion had been developed in conformance with the displaced position of the mandible. The appliance, therefore, tended to perpetuate rather than relieve the existing discrepancies.

The Problem • Specific factors which required consideration were:

1. Elimination of the posterior displacement of the left condyle.
2. Equilibration of the occlusion to permit harmonious closure of the mandible in centric relation and to allow free eccentric excursions.
3. Restoration of the missing teeth to gain posterior tooth support and to improve masticatory efficiency.

Treatment Planning and Procedures • Because upward and backward displacement of the left condyle had occurred over an extended period of time, it was felt necessary to place a temporary overlay splint on the teeth of the upper arch

to permit the musculature and the tissues of the mandibular joint to assume their normal physiologic state. The splint was made as thin as possible so the freeway space was not reduced unduly, and was kept in place for one week, which was considered the minimum time necessary for it to accomplish its purpose. On removal of the splint, it was found that, because of correction in mandibular position, the cuspal interferences were even more noticeable than when originally observed. These disharmonies were eliminated by selective grinding, with the result that simultaneous contact of all teeth occurred in centric relation, and excursive movements were uninhibited.

The occlusal system was completed with the insertion of a new mandibular partial denture. Particular care was taken throughout the fabrication procedures to assure that the denture would provide the posterior support required by the mandible. This objective was obtained through a well-adapted denture base and an occlusion which complemented that of the natural teeth (Fig. 1, below).

The symptoms of pressure and pain subsided in the temporomandibular joint within a few days after placement of the temporary treatment splint. However, improvement from the clicking and snapping was more gradual, requiring approximately a month for all symptoms to be eliminated.

Case 2 • The necessity for analyzing the occlusion as the mandible passes from rest position to full closure is further evident in the case of this 20 year old patient. His condition involved partial loss of teeth, loss of masticatory efficiency, and apparent mandibular prognathism. He had been told previously that the condition was correctible only by sectioning the mandible to move the body posteriorly, or by extracting the remaining teeth and inserting complete dentures.

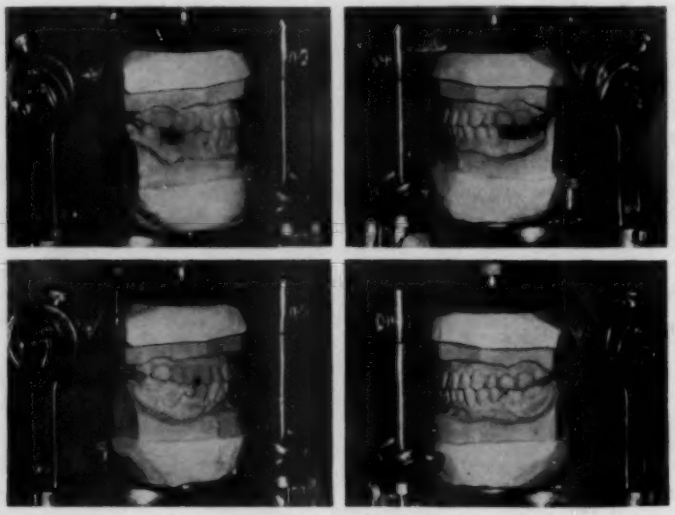

Fig. 1 • Case 1. Above left: Right side before equilibration of occlusion. Above right: Left side, showing lack of occlusal support for mandible. Below left: Right side, appliance in position. Below right: Left side, appliance providing occlusal support

These proposed treatment plans were probably based on the erroneous assumption that the mandible was in centric relation when the mandibular prognathism was observed during occlusion. This error is common when the prognathism is actually adaptive or acquired rather than real.

The condition occurs after loss and drifting of teeth, and loss of vertical dimension of occlusion make mastication impossible in centric occlusion. The patient finds that more favorable tooth contacts are made with the mandible thrust forward, so adopts the new position for chewing. When this acquired position is used for a prolonged period, the upper anterior teeth act as an orthodontic appliance and expand the lower anterior segment of the dentition. After the expansion occurs, the anterior teeth no longer can return to their original overjet relations, but frequently assume end-to-end positions when the musculature guides the mandible to centric relation.

Examination • The patient's major concern was for his appearance. This had disturbed him to the point of producing a severe inferiority complex. His inability to masticate properly was of secondary importance. The usual loss and drifting of teeth, decrease in vertical dimension, and habit of chewing with the jaw in a protruded position were observed. The lower anterior teeth were also found to be in labioversion during occlusion.

Front and profile views of the patient revealed that, although an extreme mandibular prognathism existed on full closure (Fig. 2, above), facial contours and proportions were pleasing when the jaw was at rest (Fig. 2, below left). This observation immediately ruled out the indication for repositioning of the mandible through surgical procedures.

Oral examination and analysis of the mounted study casts showed that the mandible moved back several millimeters into centric relation when it was not in-

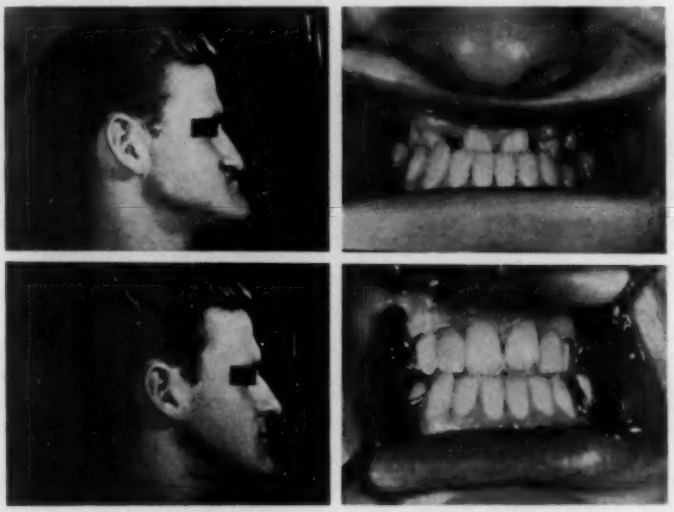

Fig. 2 • Case 2. Above left: Mandible in position adopted for function. Above right: Teeth occluded in prognathic position. Below left: Mandible at physiologic rest (no treatment). Below right: Appliances in position

fluenced by the teeth. When the mandible was in centric relation, initial tooth contact was made by end-to-end occlusion of the anterior teeth. At this point the vertical dimension was suitable for establishment of the occlusion because facial proportions were satisfactory, and approximately 3 mm. of freeway space was provided. It was noted, however, that in this relationship both the upper and lower posterior teeth were considerably short of the desired plane of occlusion.

The Problem • Specific factors which required consideration were:

1. Development of an occlusion in centric relation at an acceptable vertical dimension.
2. Improvement of the patient's appearance by making bilateral protrusion of the mandible unnecessary for mastication.

Treatment Planning and Procedures • Since the mandible moved posteriorly several millimeters into centric relation when freed from the influence of the occlusion, elimination of the acquired prognathism became automatic with the establishment of a physiologically correct occlusion. This was accomplished through placement of combination partial dentures and overlay splints in both dental arches (Fig. 2, below right).

The occlusion was first developed in wax on duplicate refractory casts, and later refined on master casts in the articulator. Cuspal inclines were determined by the condylar guidances which were recorded from the patient and by a flat incisal guidance on the instrument. The flat incisal guidance was selected because, since the anterior teeth were in end-to-end position, no rise was required during incision; also, it permitted development of relatively flat inclined planes, thereby minimizing lateral forces during mastication.

On delivery of the appliances, the patient stated that, within his memory, his jaws had never been as comfortable before. He experienced no difficulty in chewing, and did not require an adaptive or "learning" period. As might be expected, the most important gain from his standpoint was the esthetic result which produced an immediate improvement in his morale.

Case 3 • The occlusion of this patient was typical of the deep overbite which is due to overeruption of the anterior teeth (Fig. 3, above left). It illustrates the overbite condition in its simplest form; that is, it was not complicated by temporomandibular joint problems, drifting of the teeth, or other abnormalities.

Examination • A valuable diagnostic point in instances such as this is that front and profile views of the face usually show normal proportions when the teeth are occluded and when the jaw is at rest. However, the patient tends to have a toothy appearance during laughter and speech. It is also observed that the anterior teeth extend beyond the normal plane of occlusion and are relatively too long for a favorable esthetic effect (Fig. 3, above right).

The patient's complaint was of soreness where the lower anterior teeth contacted the soft tissues immediately behind the upper anterior teeth. Examination revealed that there was approximately 2 mm. of freeway space when the mandible was at physiologic rest, and that closure from rest brought all the teeth into simultaneous contact without interference. Although several shallow facets were observed at the cingula of the upper incisors, there was no evidence of abnormal tooth mobility or periodontal involvement. The soft tissues at the lingual aspect of these teeth showed imprints about 2 mm. deep which were produced by the extruded lower incisors.

The dental arches were well formed, with all teeth in position except the third molars and the upper left second bi-

cuspid. Centric occlusion of the posterior teeth was excellent, but the very steep rise at the cuspid region of each side forced a rapid separation of the posterior teeth during lateral excursions.

Analysis of the study casts in the articulator showed contact between the lower anterior teeth and the upper gingival tissues. Because of the nonresilience of the cast material, it was necessary to scrape the contacting areas on the upper cast to allow the teeth to come into occlusion. Closure on the hinge axis of the instrument then brought all the teeth into simultaneous contact in the same manner as was observed in the mouth.

The position of the overerupted anterior teeth was such that premature contact of these teeth might have been expected. However, wear had occurred with sufficient rapidity so that no damage had been done to the periodontal tissues, and no mandibular displacement or temporomandibular joint problems had been produced. It was recognized, however, that the treatment plan must ensure against subsequent damage to the temporomandibular joint and periodontium, as normal wear of the posterior teeth would reduce the vertical dimension of occlusion and possibly increase pressure on the anterior teeth.

The Problem • Specific factors which required consideration were:

1. Elimination of the traumatogenic contact of the lower anterior teeth against the upper incisors and gingival tissues.

2. Equilibration of the occlusion to permit free lateral excursions and to bring the posterior teeth into contact in lateral positions.

3. Reduction of the length of the upper anterior teeth to gain the optimum esthetic effect.

4. Replacement of the missing upper second bicuspid.

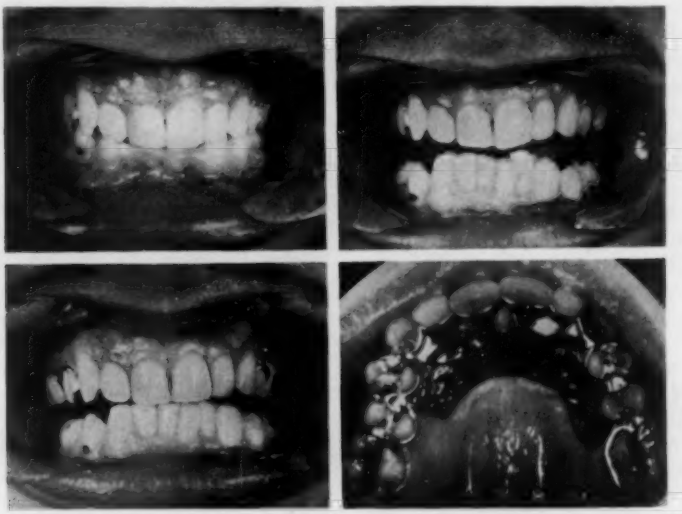

Fig. 3 • Case 3. Above left: Deep anterior overbite due to overeruption of anterior teeth. Above right: Anterior teeth erupted beyond normal plane of occlusion, particularly in lower arch. Below left: Anterior teeth modified. Below right: Appliance in position. Note stops to prevent extrusion of lower anterior teeth

5. Prevention of extrusion of the lower incisors subsequent to reduction of their length.

Treatment Planning and Procedures • Determination of the proper vertical dimension of occlusion to be used for this patient was based on two major considerations: (1) if the vertical dimension of occlusion were decreased incident to treatment procedures, the original problem would be made worse because the lower anterior teeth were already in potentially damaging apposition with the maxillary structures; and (2) if the vertical dimension of occlusion were increased by permanent restorations or overlays, the amount of freeway space would be reduced to less than 2 mm.—a condition which could not be tolerated by the periodontium or the musculature. Since the vertical dimension of occlusion could not be increased or decreased to any advantage, no change was indicated.

Before adjustments of the natural teeth were undertaken, the mounted study casts were modified to determine the most favorable means of gaining the desired esthetic and functional results. This included shortening the anterior teeth to bring them into harmony with the posterior plane of occlusion, and equilibration of all teeth to permit free lateral excursions. The lower anterior teeth were reduced to remove all contact with the upper cast and provide space for an upper appliance to act as a "stop" to prevent extrusion of the lower anterior teeth.

The natural upper teeth were then modified only to the extent necessary for placement of the appliance.

A refractory cast of the prepared upper arch was substituted for the stone cast in the articulator. A pattern was waxed in the form of a horseshoe, care being taken to wax the anterior palatal area into close contact with the modified lower teeth to obtain the desired stop effect in the final casting.

After the appliance was inserted (Fig. 3, below), the natural lower anterior teeth were reduced as had been done on the study cast, sufficiently to bring them into static contact with the upper appliance when the posterior teeth were in centric occlusion. After this, other occlusal adjustments, similar to those which had been made on the study casts, were accomplished.

The patient was pleased with the esthetic improvement in his dentition, and with the increased comfort and masticatory efficiency he experienced after equilibration of the occlusion and insertion of the appliance.

Case 4 • This 19 year old patient had an occlusion which was characteristic of the deep overbite due to undereruption of the posterior teeth. The case was selected for reporting because, without being complicated by loss of teeth, it involved inadequate vertical dimension of occlusion, mandibular displacement and a temporomandibular joint problem.

Examination • Front and profile views of the patient are particularly valuable in establishing a diagnosis in this type of overbite, because the face shows normal proportions when the jaw is at rest, but appears collapsed, with the lips compressed and curled outward, when the teeth are occluded (Fig. 4, left). It is observed during laughter and speech that the anterior teeth occupy normal positions, although the posterior teeth, because of their undereruption, fall short of the normal plane of occlusion. The undereruption can involve the teeth of the maxilla, mandible, or both. In this case the fact that the posterior teeth had not erupted sufficiently accounted for the below normal vertical dimension of occlusion, and the above average 6.5 mm. freeway space (Fig. 4, above right).

The patient complained of occasional tenderness in the condylar regions, but his major concern was soreness and

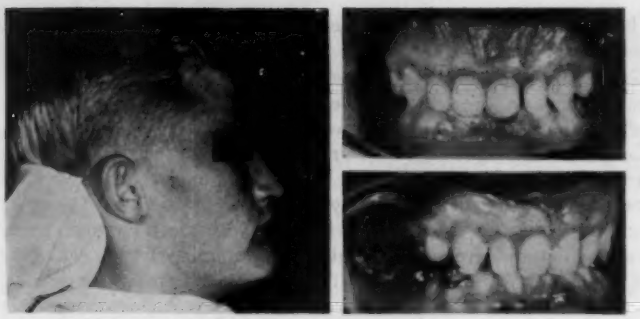

Fig. 4 • Case 4. Left: Teeth occluded. Note curled lower lip and compressed upper lip. Above right: Deep anterior overbite due to undereruption of posterior teeth. Below right: Occlusion established at proper vertical dimension of occlusion

bleeding of the gingivae at the labial aspect of the lower incisors and immediately behind the upper incisors. This condition had caused him discomfort repeatedly, and he had been treated on several occasions for what had been called "pyorrhea." On oral examination, it was found that there was such an extreme and close overbite that the upper lingual and lower labial gingivae were being severely traumatized by the shearing effect of the incisors during mastication and swallowing.

The dental arches were well formed and all teeth were in position except the lower left third molar. In spite of the generally favorable alignment in each arch, the posterior teeth assumed end-to-end relations, rather than interdigitating normally on full closure, and the whole lower arch appeared to be displaced posteriorly. The presence of elongated facets on the opposed surfaces of the incisors was evidence of the intimate and traumatogenic contact between these teeth in function. However, there was no abnormal loss of bone or mobility of the teeth.

Analysis of the study casts when the articulator was closed on its hinge axis confirmed the presence of premature contact between the upper and lower anterior teeth. In the absence of tooth mobility, it was obvious that the condyles were being forced posteriorly on closure of the mandible, undoubtedly causing the discomfort which the patient experienced.

The Problem • Specific factors which required consideration were:

1. Elimination of the traumatogenic contact of the anterior teeth with their opponents and with the adjacent gingival tissues.

2. Provision for the mandible to return to its proper physiologic position, that is, centric relation.

3. Development of an occlusion in harmony with the condyle paths and anterior tooth positions at an acceptable vertical dimension.

Treatment Planning and Procedures • Because of the presence of 6.5 mm. freeway space, and the obvious overclosure of the mandible when the teeth were occluded, an increase of approximately 3 mm. in the vertical dimension of occlusion was indicated. The decision to obtain this increase by placing overlay splints on both the upper and lower teeth was based on the fact that the posterior

teeth of both arches were short of the normal occlusal plane.

As in Case 1, it was necessary to place a temporary splint on the teeth of the upper arch to permit the musculature and the tissues of the temporomandibular joint to return to physiologic normalcy. This procedure also gave an opportunity to test the adaptability of the patient to an occlusion with an increased vertical dimension, and to observe whether relief from the temporomandibular joint discomfort would ensue.

After the splint had been in position for approximately two weeks, all symptoms of temporomandibular joint discomfort and gingival trauma were eliminated, and after removal of the splint it was found that the mandible had moved anteriorly to such an extent that there was an increase in the premature contact between the opposing anterior teeth. This did not, however, pose any further problem, since the contact did not occur at the increased vertical dimension that was going to be used in correcting the occlusion.

Master stone casts and duplicate refractory casts were mounted in the articulator, the lower cast being mounted to an accurate registration of centric relation obtained at the desired vertical dimension of occlusion. An occlusion was then created in upper and lower wax patterns for cast gold overlay splints (Fig. 4, below right). Cuspal inclines were developed in harmony with the patient's condylar paths and anterior tooth positions.

The patient encountered no difficulty in wearing the splints. His appearance on closure of the mandible was improved, and he reported greater ease and comfort in chewing. No return of the original symptoms was experienced.

DISCUSSION

When the choice is available, fixed restorations are preferred to removable appliances because the fixed restorations reproduce tooth contours more naturally and minimize the hazard of caries. However, fixed restorations do not permit as wide dispersal of masticatory forces as do removable appliances with rigid connectors. This is particularly true where crowns are lengthened to increase the vertical dimension of occlusion.

When removable prosthetic appliances are indicated for temporary or prolonged use, protective measures are required to prevent decalcification of the enamel, especially where overlays cover the teeth. Recontouring of irregular tooth surfaces and preventive odontotomy may be indicated before final impressions are taken. The twice yearly application of a suitable fluoride solution may be advantageous. Above all, patients must be impressed with the necessity for meticulous care of the teeth and appliances.

The similarity of certain temporomandibular joint and malrelationship problems permits grouping for diagnostic and planning purposes. Corrective procedures, however, must be based on the specific biologic and physical requirements and limitations of the individual case. Treatment should be undertaken only when these factors are clearly understood.

The objectives of treatment are attained largely through establishment of an occlusion which is in harmony with centric relation at a physiologically acceptable vertical dimension.

Factors of occlusion to be observed in everyday practice

Clyde H. Schuyler, D.D.S., New York

Occlusion of the natural dentition is one of the most important factors in the practice of dentistry. It is a most needed and timely topic. Favorable oral health and favorable oral physiology are dependent on an innocuous occlusal relationship of the teeth in all functional positions, both static and kinetic.

A better understanding of occlusion is imperative if a better oral health service is to be rendered. It is the key to better dentistry. Only by a coordination of similar guiding tooth surfaces is the maximum oral function with the most favorable physiological distribution of functional stresses possible.

Dental schools are giving more thought to teaching fundamental principles of occlusion, but too often there is not interdepartmental coordination in teaching this subject. It would seem most desirable that there should be the greatest coordination and cooperation in every department in each school in recognizing and teaching accepted factors.

Basic principles apply in periodontics, orthodontics, crown and bridge, prosthodontics and in general operative procedures. The student may leave his dental school confused when one department fails to recognize the subject material stressed by another department. An example of this might be the stress placed by one department on the mounting of accurate casts in an adjustable articulating instrument for the purpose of studying occlusion of the opposing teeth in both centric and eccentric positions for diagnostic purposes before either constructive or corrective procedures are initiated, and as an aid in coordinating centric occlusion with centric maxillomandibular relation and coordinating eccentric functional occlusion in reconstructive procedures; whereas, in another department whose primary interest is, or should be, occlusion, equal stress is placed on the obtaining of accurate casts, both before and after treatment, which are highly polished with talcum powder but never placed on an articulating instrument where the true articulation of the opposing teeth in either centric or eccentric positions can be studied. They have questioned the value of mounting these casts in an articulating instrument for study purposes. To the untrained eye, a section of tissue, or a smear under the microscope might be of little diagnostic value but, to the trained eye, they have great value in both diagnosis and treatment. If the orthodontists developed the habit of mounting casts for study purposes, both they and their patients might profit materially by it.

FACTORS CONTROLLING MOVEMENTS OF MANDIBLE

In a discussion of occlusion, consideration should first be given to the factors controlling the movements of the mandible.

All movements of the mandible are motivated by the muscles of mastication. The direction of movement of the mandible, when the opposing teeth are not in occlusal contact, is controlled by the muscles of mastication and the temporomandibular articulation, but when the opposing teeth of the natural dentition come into contact, the guiding inclines of the teeth immediately assume almost complete control of the direction and the extent of movement of the mandible. It is well, therefore, to discuss tooth inclines as they influence mandibular movements, oral function and oral health.

A simultaneous static contact of all opposing teeth when the mandible is in physiologic centric relation to the maxilla is an accepted desirable factor. This is recognized as favorable centric occlusion.

The maintenance of occlusal contact of all opposing teeth in movements from centric to eccentric position or from eccentric to centric position depends on a coordination of the contour of all the contacting tooth surfaces in all of the eccentric positions with the two extreme or terminal factors of control. They are the incisal guidance and the movement of the condyle in the glenoid fossa. Although the restricted movement of the condyle in the glenoid fossa has its influence on occlusion, tooth articulation influences the movement of the condyle in the glenoid fossa to a much greater degree than is generally realized.

In extreme cases of occlusal disharmony, the joint may not accommodate itself to the occlusal factor. An example might be the extremely steep incisal guidance which precludes posterior eccentric tooth contact. Many limited occlusal anomalies are, however, compensated for in the development and function of the joint. Some types of occlusal anomalies contribute to a pathologic development of the joint.

In extensive or complete oral rehabilitation it would seem desirable to obtain roentgenograms of the temporomandibular joint to determine the relation of the condyles in the glenoid fossae before starting operative procedures, as many abnormal conditions within the joint can and should be corrected during the operative procedures. What might seem to be favorable changes in the maxillomandibular relation should be verified by roentgenograms.

DETERMINATION OF CENTRIC RELATION

The determination of centric maxillomandibular relation is one of the most important steps in all dental constructive or corrective procedures. The definition of centric relation, supported by the Academy of Denture Prosthetics—that is, "the most distal relation of the mandible to the maxilla from which lateral movements can be made"—is quite satisfactory insofar as it pertains to normal temporomandibular joints. It seems not to be satisfactory in those instances in which abnormal mobility of the condyle in the glenoid fossa has developed as the result of occlusal anomalies. Figure 1 shows the position of the condyles in the glenoid fossae in the recorded maxillomandibular relation which was accepted as centric relation for complete oral rehabilitation in one instance. The discomfort of the patient necessitated the removal of the offending dental restorations.

The mandible in this instance should be moved forward in its relation to the maxilla and the desirability of the new position verified by additional roentgenograms.

When a repositioning of the condyle is indicated it must be made within physiological limits. It should be made for specific reasons with due consideration to all factors involved. Roentgenograms before and during occlusal reconstruction are invaluable. There is great need for research and technical development in this field. It would seem that the orthodontist could contribute materially

to, and profit by, such a research program by taking roentgenograms of the joint previous to, during, and for a period after orthodontic treatment.

In the normal occlusion of the natural dentition, the lingual contour of the upper anterior teeth represents the incisal guidance. The incisal guidance is of such importance that it might be considered the key to eccentric functional occlusion of the posterior teeth and the key to the formation of the occlusal contours of the posterior teeth in complete oral rehabilitation.

The anterior and posterior teeth on the working side will maintain contact throughout an eccentric movement only if there is conformity of contour of incisal guidance and the contacting posterior tooth surfaces. A concave incisal guidance will conform to, or require for eccentric functional harmony, concave guiding surfaces of the posterior teeth. A convex incisal guidance will conform to, or require for eccentric functional harmony, convex guiding surfaces of the posterior teeth. The straighter plane of the incisal guidance will produce, or require for eccentric functional harmony, straighter planes on the posterior teeth.

Figure 2 illustrates how the incisal guidance is the controlling factor of the occlusal contours of the posterior teeth. Stated conversely: if both anterior and posterior teeth are in contact in centric position, and maintain contact throughout eccentric excursion, the incisal guidance must conform to the occlusal contours of the posterior teeth. A convex occlusal contour of posterior teeth will require for conformity a convex incisal guidance (Fig. 2,A). A concave posterior occlusal contour will conform to, or require for conformity, a concave incisal guidance (Fig. 2,B). Straighter incline occlusal contours will conform to, or require for conformity, a straighter surfaced incisal guidance (Fig. 2,C).

In reconstructive procedures the most favorable incisal guidance, which to a great degree is within the dentist's control, should be established, after which the posterior occlusal contours are made to conform to the established incisal and condylar guidances.

Some groups maintain that the convex posterior tooth form is the most favorable form. This view might be questioned. The convex contour locks the teeth more definitely in the centric position as the

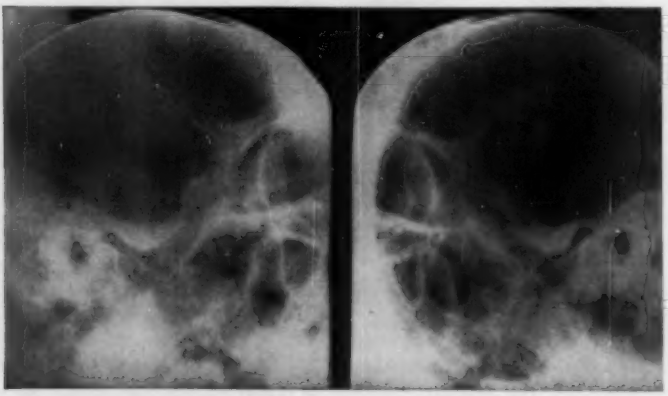

Fig. 1 • Position of condyles in glenoid fossae in recorded maxillomandibular relation which was accepted as centric relation

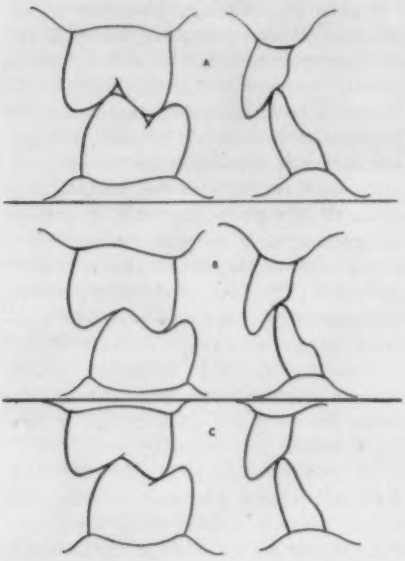

Fig. 2 • Illustrates how the incisal guidance is the controlling factor of occlusal contours of posterior teeth

guiding inclines immediately proximal to the centric are steeper than the guiding factor in more distant eccentric positions. The straighter surfaced tooth or the concave tooth presents a reduced inclination immediately proximal to the centric position. The concave incisal guidance and concave posterior occlusal contour might give the greatest freedom of movement in the centric and eccentric positions.

The occlusal contours of newly erupted posterior teeth may be convex. Initial wear reduces the convexities to straighter planes. Continued wear most often develops concave guiding occlusal contours.

Some well known and commonly used articulating instruments have these three types of incisal guide attachments. The Gysi and House instruments, and Sears incisal guidance for the Hanau instrument have the straight incisal guide factor. The McCollum and Terrell instruments have the convex incisal guide attachment. The Hanau regular and Swedish Dentatus have concave incisal guidance attachments.

The convex incisal guidance and convex posterior occlusal contours restrict eccentric movements drastically as the initial movement from centric relation is controlled by the steepest portion of the guiding contour. The less the steepness of the inclination from the horizontal of the incisal guidance, the less steepness of posterior occluding surfaces is required to maintain eccentric contacts.

In grinding to correct occlusal anomalies, where the ideal may be impossible to accomplish, the objective should be the elimination of factors contributing to, or which may contribute to, pathologic conditions. The degree to which incisal guidance may be reduced or modified may be the key to the end result which may be accomplished in coordinating posterior tooth function. This corrective grinding might incorporate essential procedures to coordinate static centric occlusion with centric maxillomandibular relation. It also might coordinate the guiding inclines of the anterior teeth incisal guidances with the working side functional inclines of the posterior teeth in both the right and the left lateral eccentric positions. I can see no advantage in continuing these corrective procedures to accomplish contact of the posterior teeth on the balancing side, or a contact of the posterior teeth in a protrusive relationship. These balancing contacts may be very desirable in a prosthesis, but they are of very questionable value in maintaining the health and function of the natural dentition.

In corrective or restorative procedures, the elimination of existing nonexcessive contacts of the anterior teeth in the centric relation should not be a common practice, as it places an unfavorable distribution of occlusal stress on the posterior teeth in both centric and eccentric positions. When anterior tooth contact

is removed, the teeth may continue to erupt, restoring centric contact, at which time they will be in traumatic contact in eccentric positions, as the then existing incisal guidance will not be in conformity to the established guiding contours of the posterior teeth.

In complete oral rehabilitation, the establishment of a favorable incisal guidance should be the first consideration of the dentist, as it is the key to the formation of the occluding contours of all posterior teeth.[1] For reasons previously mentioned, when the anterior teeth have been in contact they should be restored to contact.

If the orthodontist is giving thought to oral physiology and the maintenance of oral health, as well as improved facial appearance, throughout the life of his patients, he must give thought to functional coordination of the teeth during and at the completion of his treatment. In planning treatment he must give thought to the factor of incisal guidance and its conformity to the occluding contours of the posterior teeth. The vertical positioning of anterior teeth creating the excessively steep incisal guidance may preclude eccentric functional contact of the posterior teeth. The condition caused by excessively steep incisal guidance may, in a few years, lead to trauma of the lower anterior teeth or a forward drifting of the upper anterior teeth with loss of proximating contacts, resulting in a premature loss of the upper or the lower anterior teeth, or the premature loss of both upper and lower anterior teeth.

Figure 3 shows models of a young patient for whom orthodontic treatment had been completed about three years previously. The esthetic result had been very satisfactory. The first bicuspids were removed during treatment and the anterior teeth moved distally, resulting in a very steep incisal guidance. All of the balancing inclines of the posterior teeth are very steep, whereas the working in-

1. Schuyler, C. H. Factors of occlusion applicable to restorative dentistry. J. Pros. Den. 3:772 Nov. 1953.

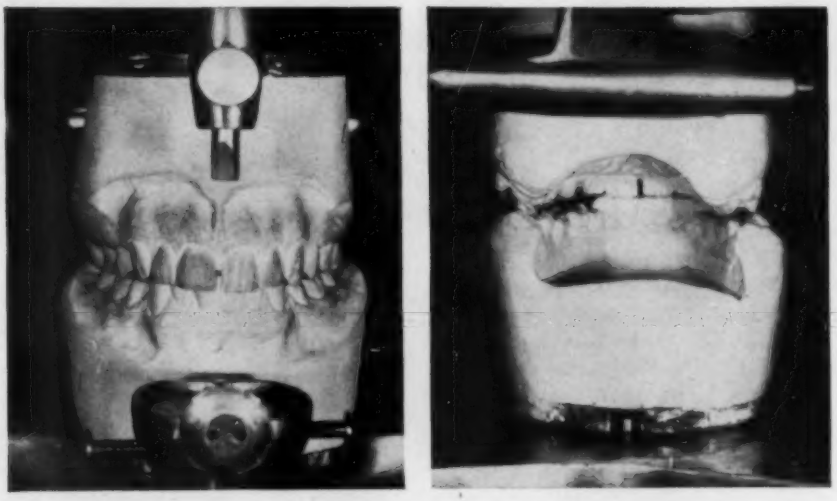

Fig. 3 • Models of patient for whom orthodontic treatment had been completed about three years previously

clines, that is the buccal inclines of the upper teeth and lingual inclines of the lower teeth are more nearly parallel to the horizontal.

Because of the very steep incisal guidance, the shallow working inclines and the steep balancing inclines of the posterior teeth, there is no functional contact of the posterior teeth on the working side in the lateral eccentric position but excessive contact of the second and third molars on the balancing side. The anterior teeth show evidence of trauma and wear with the beginning of separation of the upper teeth and crowding of the lower teeth.

The patient was referred to me because she was suffering from subluxation of the temporomandibular joints due to the premature or excessive balancing contacts of the molars.

The buccal or lingual inclination of the posterior teeth also changes the inclination of the buccal or the lingual occlusal inclinations to the horizontal plane with its effect on eccentric functional contacts.

Models of the mouth of a patient in his early thirties are shown in Figure 4. The excessively steep incisal guidance and the shallow working inclines and steep balancing inclines of the posterior teeth resulted in a lack of eccentric functional contact on the working side with excessive contact on the anterior teeth and the balancing posterior tooth inclines. The damage to the anterior teeth is evident.

In a favorable articulation of the natural dentition, both posterior and anterior teeth make simultaneous contact in centric occlusion. In lateral eccentric positions the teeth posterior to the median line on the working side should make simultaneous contacts.

An anterior tooth, a bicuspid and a molar in the same quadrant are shown in Figure 5,A. Premature contacts in the centric relation, or a wedging thrust, normally would be relieved by spot grinding the lower buccal cusps and the upper lingual cusp of the bicuspids and molars and the incisal edge of the lower anterior tooth. The grinding of the central fossa of the posterior tooth, or the lingual aspect of the upper anterior tooth, would cause an increased steepness of the lateral or guiding inclines of the tooth and contribute to eccentric trauma.

The same teeth in a lateral eccentric position are shown in Figure 5,B. All premature contacts in this eccentric position should be relieved by reducing the steepness of the inclines marked B.U. on the upper bicuspids and molars and L.L. on the lower bicuspids and molars, and by changing the steepness of the lingual guiding incline on the upper anterior tooth. The reduction of points 1, 2 or 3 to relieve eccentric trauma would remove these points from their static centric contact as shown in (A) and might contribute to wedging of the teeth and closing of the vertical maxillomandibular relation. It would give no permanent relief of traumatic contacts. In the absence of trauma in the centric position, eccentric trauma is caused by the excessively steep lateral guiding inclines. Eccentric functional harmony is possible only when the steepness of lateral guiding inclines is coordinated.

In corrective grinding to relieve eccentric trauma, a reduction of the lower anterior tooth seldom gives more than temporary relief (Fig. 5,C). Where this might be necessary it is best to restore contact and a desirable incisal guidance by the use of a pinledge inlay "A" on the lingual aspect of the upper tooth.

In occlusal reconstructive procedures, the planning and establishing of a favorable incisal guidance should be the first step as eccentric functional harmony is possible only when all posterior tooth inclines conform to an established incisal guidance.

Leaving the anterior teeth out of centric contact in reconstructive procedures is not good practice. It subjects weakened posterior supports to an un-

necessary overload. Most often the anterior teeth will continue to erupt until contact is restored. Progressively, with the eruption, the anterior teeth become traumatized. When contact is restored through eruption, the steep incisal guidance also may preclude normal eccentric contact of the posterior teeth.

Simultaneous contact of teeth on the opposite or balancing side would not be detrimental, but might be of little or no value in the function of mastication or in the distribution of occlusal stresses, as the major muscles of mastication are in a state of contraction only on the working side and the force applied is limited

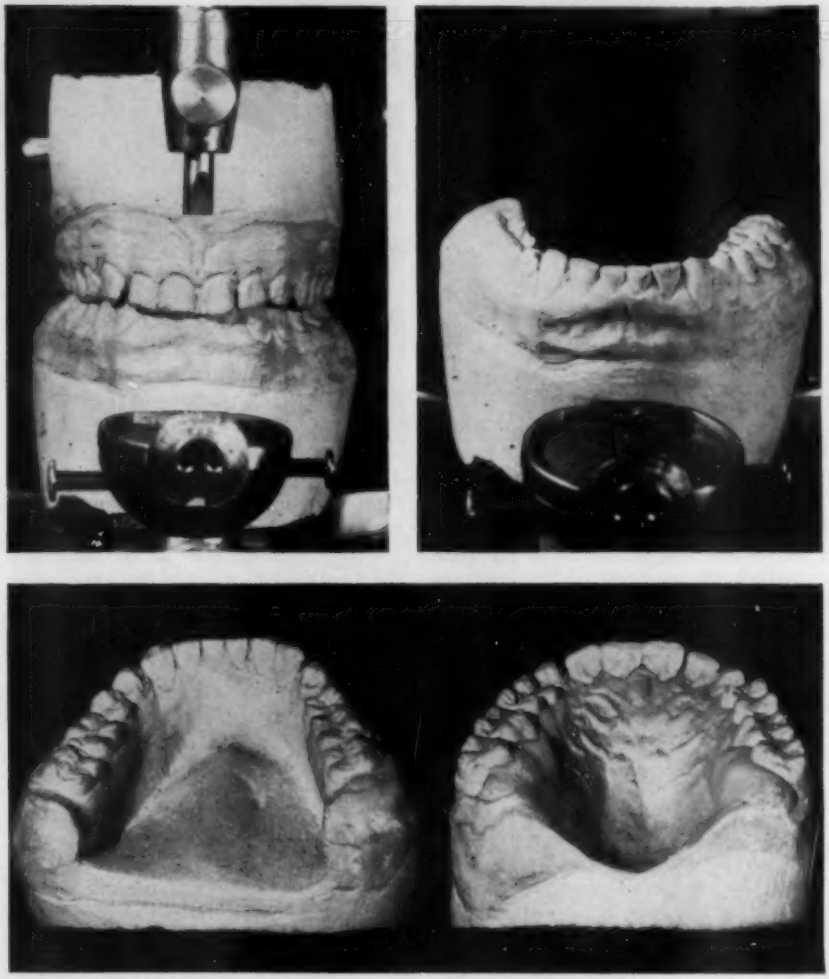

Fig. 4 • Models of mouth of patient in his early thirties

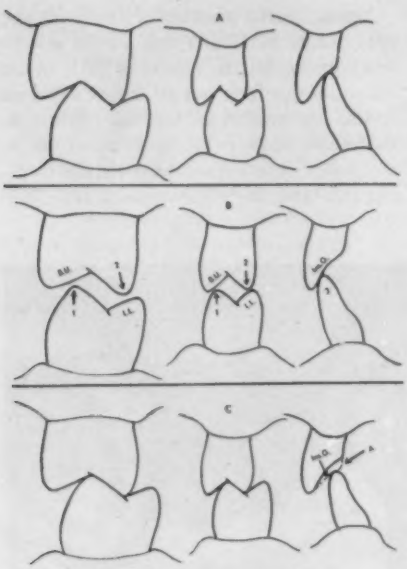

Fig. 5 • Anterior tooth, bicuspid and molar in the same quadrant in various relations

by tissue tolerance or to that force which is essential for mastication.

The premature contact of teeth on the balancing side is one of the most damaging types of malocclusion, contributing to a premature loss of the teeth involved, or pathologic condition of the temporomandibular articulation or both. When tooth contacts are found to exist on the nonfunctioning or balancing side, it is extremely difficult to differentiate between those which are harmless and those which are premature or destructive. Premature contacts act as fulcrums and cause the condyle to be drawn down and away from the articulating incline of the glenoid fossa in its forward movement. No means are available for observing this tension or abnormal movement within the joint. A clicking, a lack of smoothness in function, or pain within the joint, or trauma on posterior teeth which may be evident in roentgenograms, should cause the dentist to suspect immediately that the balancing side contacts are excessive and undesirable.

A common error in oral rehabilitation in which either a fixed or a removable restoration is employed is the use, without correction, of a lower molar abutment which, because of mesiolingual migration, or over-eruption, has excessive steepness to its balancing inclines. The resulting traumatic balancing side contacts may cause the premature loss of the abutment teeth, opposing teeth, or subluxation of the joint.

The mesial and lingual tipping of the lower second and third molars caused by the early loss of a first molar is shown in Figure 6. The inclination of the posterior teeth and the excessive curve of Spee resulted in excessive balancing side contacts of the last molars and lack of functional or working side contacts as shown in the right lateral eccentric relation of the mounted casts. The eccentric balancing side contacts contributed to a lack of smoothness in function and subluxation of the temporomandibular joint.

This same condition is demonstrated in Figure 7. The balancing side contacts and lack of functional contact in the right lateral eccentric position of the mounted casts can be noted. Also the inclination of the lower molar teeth and steep balancing incline of the upper teeth can be seen. A common error in oral rehabilitation or in all restorative procedures is the dentist's failure to note these unfavorable inclinations of tooth surfaces which invariably contribute to premature balancing side contacts and dysfunction of the temporomandibular joints, and at times premature loss of the teeth involved. This patient was relieved of temporomandibular joint dysfunction when his occlusal problem was corrected.

The abrasive effect of the mastication of food may cause working tooth surfaces or inclines to wear more rapidly than balancing surfaces, therefore balancing contacts may become progressively traumatic as the teeth wear in function.

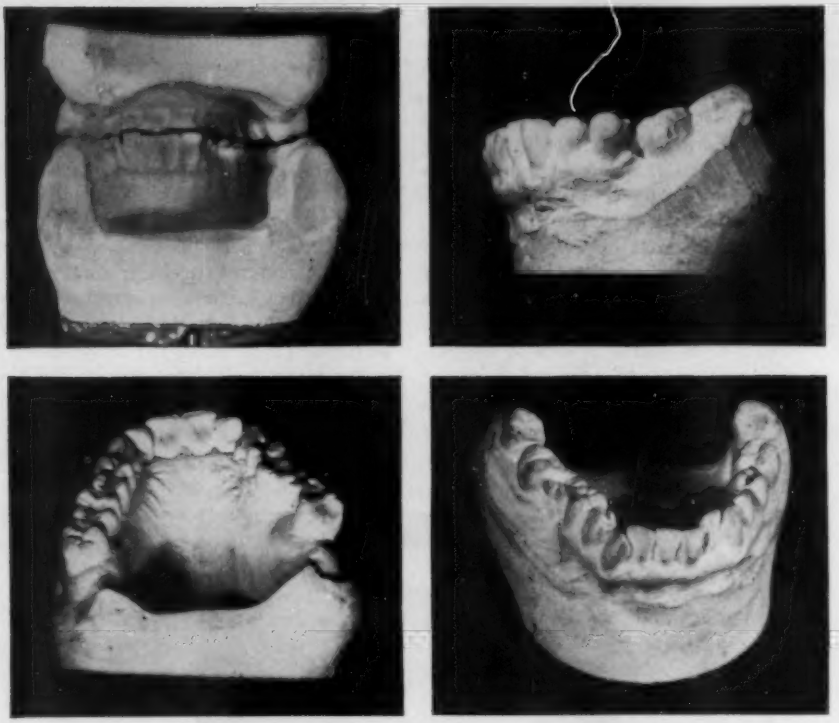

Fig. 6 • Mesial and lingual tipping of lower second and third molars caused by early loss of first molar

The general dentist, in serving his patients from childhood, may thoughtlessly contribute to their malocclusion, or by thoughtfulness and vision he may correct or prevent factors which might contribute to trauma and the premature loss of his patients' teeth, or temporomandibular joint injury. By thoughtless dentistry the perfect occlusion may be wrecked. By thoughtful dentistry many occlusal factors which might contribute to the premature loss of the teeth can be eliminated. While inserting proximo-occlusal alloy fillings dentists often intentionally underfill the tooth to keep the patient from biting the filling out before it is completely set. By underfilling a tooth he is changing the occlusal inclinations of the tooth, creating greater steepness of eccentric guiding contours (Fig. 8).

An underfilled tooth does not have normal contact in centric relation. In a short period of time, by eruption or migration, or both, normal contact may be restored in centric relation. Progressively, with this change, trauma may be developing in eccentric positions. I saw a young woman recently who was suffering from pain in the temporomandibular joints and general malocclusion, whose occlusion appeared to have been wrecked by this type of operative dentistry. All of her posterior teeth had been restored with alloy fillings of the underfilled variety. I am not condemning alloy as a filling material, and I must add that not all inlays are free from this fault, as I

have heard dentists advocate the carving of inlays "slightly light" of occlusal contact; they believe this will save time in fitting.

Lack of smoothness at the border of a filling, resulting from either underfilling or overfilling the cavity, can contribute to trauma of the tooth or injury of the temporomandibular joint.

One of the most destructive forms of malocclusion is the premature contact of balancing cusp inclines. It contributes not only to the premature loss of the teeth involved, but to a lack of smoothness in function and subluxation of the temporomandibular joint. The molars are the teeth that are involved most frequently.

Before placing fillings in carious posterior teeth, a study of the centric and eccentric occlusion of the teeth involved should be a routine, preliminary procedure. Many undesirable occlusal conditions are corrected easily at this time. An example might be the elimination of premature balancing contacts while filling a lower molar. The long upper lingual cusp may be reduced by spot grinding to eliminate the premature balancing contact. Centric contact with the reduced upper lingual cusp would then be restored by building the occlusal filling in the lower tooth into contact with the reduced upper lingual cusp (Fig. 9). The same relief might be accomplished while placing a filling in an upper tooth. This

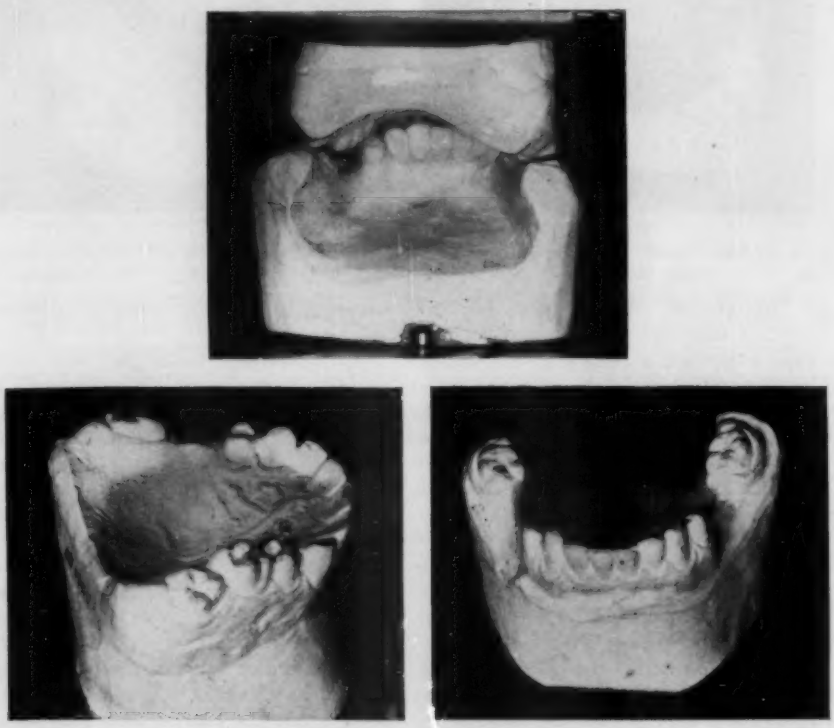

Fig. 7 • Shows balancing side contacts and lack of functional contact in right lateral eccentric position of mounted casts

Fig. 8 • A: Original lateral occlusal inclines. B: Increased steepness of lateral tooth inclines caused by underfilling tooth

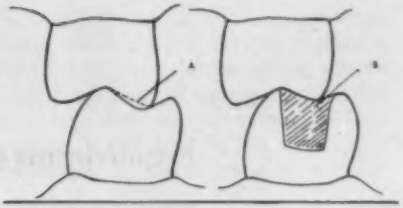

Fig. 9 • Showing reduction (A) of upper lingual cusp after which contact with this cusp is restored by the filling (B) placed in lower tooth

is an ounce of prevention that might mean much to the future comfort and happiness of the patient.

Space does not permit a discussion of selective spot grinding to produce functional coordination of the teeth. This has been covered in previously published articles.[2,3]

COMMENT

One of the next, great forward steps in the practice of dentistry as a health service will result from the dentist's improved concept of occlusion and a realization of his responsibility in perfecting and maintaining it. The health professions, medicine and dentistry, have been slow to recognize malocclusion as the possible contributing factor of various local pain syndromes including headache, loss of hearing acumen, vertigo and tinnitus; as well as pain associated with function of the temporomandibular joint.

Many pathetic sufferers of conditions associated with malocclusion have failed to obtain the relief which they should have received because the members of the dental profession have failed to recognize the possible association of the symptoms with malocclusion. In some instances, when the possible association has been recognized, the dentist was not qualified to give relief and, when his attempts at occlusal adjustment failed, the possible association was discredited and the patient continued to suffer as the "victim of arthritis, neuralgia or some other vague malady." At times such patients have been unjustly classified as neurotics.

The frequency of the occurrence of these symptoms, their serious impairment of health, happiness and employability, together with the inability of the average sufferer to get relief, would seem to be of sufficiently great importance to warrant an extensive research program on a national level as a public health service. The federal government in the past few years has made liberal contributions to dental research programs. It would seem that the need and the magnitude of this program is of such importance to the health and welfare of the public that it should receive the support of research groups both public and private.

In fulfilling their responsibility to the profession and the public it would seem that dental schools should make additions to their teaching curriculum where necessary to acquaint the graduating dental student with the dentist's responsibility in providing relief for these patients and to qualify dentists desiring special training so they can render such a service.

400 Madison Avenue

2. Schuyler, C. H. Correction of occlusal disharmony of natural dentition. New York D. J. 13:445 Oct. 1947.

3. Schuyler, C. H. Fundamental principles in correction of occlusal disharmony, natural and artificial. J.A.D.A. 22:1193 July 1935.

Requirements of partial denture prosthesis

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The over-all objective of partial denture prosthesis is to utilize edentulous portions of the mouth in the maintenance and function of a healthy chewing mechanism.

When the stability and retention of partial dentures are founded on the overloading of the remaining dentition, then inevitably these teeth will be lost. Teeth and their adjacent bony regions are designed to support functional traumatic forces within the limits of physiologic tolerance. It should be the criterion of a partial prosthesis that it be responsible for sustaining masticatory loads within the borders of the base region. All base-tooth connectors such as clasps and precision attachments should serve to aid in retention of the appliance and not promotion of stability.

This article deals with two prime requisites of all tissue and tooth bearing appliances, namely, the tissue base constant and centric relation. In order to determine what is demanded of prosthetic dentistry and to evaluate, exclusive of esthetics, the necessity for such restorations, a review of basic dental philosophy is in order.

BASIC PHILOSOPHY

For the most part the dental problem is a study in biomechanics. It is a study in mechanics inasmuch as teeth have a primary function to chew and chewing is a dynamic process of occluding surfaces. It is a study in biology since this act of chewing is associated with a human being.

In biology it is axiomatic that if one continues to disturb a nucleus of a cell, that cell soon dies. It follows, then, that all dentistry must conform to biologic realities.

There are three ways in which cells are destroyed:

1. By interfering with the metabolic processes by which cell life exists.
2. By the introduction of infection.
3. By means of trauma.

The dental problem comes under the heading of trauma. Therefore, the elimination of trauma should be the first concern of every practicing dentist.

The act of chewing involves stresses, forces and direction of forces. Consequently the dental problem resolves itself into one of how best the stresses and forces can be dissipated so that the traumatic impact of jaw closure will not continue to disturb the nuclei of cells and thus bring about their inevitable destruction.

One way of coping with the problem of trauma in engineering is to dissipate forces and stresses over the broadest area. This must be done likewise with teeth by having continuous, maximum occlusal contact in every functioning jaw relation. This can be accomplished only by creating occlusal surfaces that are harmonious and compatible with joint physiology.

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TISSUE BASE CONSTANT

In order to utilize any edentulous region for the foundation of occlusal function, the development of what has now become known as the tissue base constant precedes all efforts in articulation. As in any structural problem, the development of the base segment is always the first step.

The tissue base constant may be defined as that intimate mucosa-base relationship on which stability is based.

Lucia[1] states that, "The tissue base constant cannot be overemphasized when we realize it is the connecting link between the occlusal surfaces of the teeth and hinge dynamics."

In the light of the Mucostatic Principle, it is shown that hard and soft tissue can support the load-bearing demands of mastication. The only effect any impression technic can have is on the soft tissue. So-called tissue resiliency is nothing more than soft tissue returning from a displaced unnatural form to a natural tissue outline.

It is accepted that the mucosa more readily resists vertical displacement than horizontal movement. This simplifies the problem in partial denture prosthesis since some form of attachment connects the base to the teeth.

The perimeter of any impression should encompass the maximum bone-supported mucosa with the necessary mutations for frenums, aponeuroses and muscle attachments. Reliefs are contraindicated as they reduce the usable contacting base area where there is the least possibility of soft tissue displacement.

Technically, taking the impression is simple. All that is necessary is a spacer relieved tray that covers the desired region and an impression material that does not demand force to flow and copy. Combinations of zinc oxide-eugenol impression material for the edentulous areas and elastic impression materials for the natural teeth are most effective.

Not to be overlooked is the fact that the base must be an accurate reproduction of the impression in order to provide the solid platform or foundation for the prosthesis. Briefly, it can be said that the tissue base constant originates in the impression, is delivered by the base and is perpetuated by the articulation.

CENTRIC RELATION

Of all the factors pertinent to the maintenance of oral function and health, and also for the most part under the dentist's control, none is so essential as centric relation. Whether this is accomplished by modifying natural occlusal tooth anatomy by grinding, or by the fabrication of entirely new occlusal tooth surfaces, is not too important. What is important is that it be established. Centric relation is important because the chewing stroke is a dynamic series of occluding tooth surfaces. Because it is dynamic, the necessity of correctly relating the involved parts to each other must be recognized.

All movements of the mandible pertain to rotary and translatory motion. As is well known, the geometrical factors of rotary motion are the center of its origin and the radius of the resultant arc. In any body capable of this movement, the same center exists regardless of whether the performance is vertical or horizontal. Since the mandible is the moving member of the chewing mechanism, it naturally follows that the center of rotation is found within the body in the proximity of the joint or condyle.

It is probably due to the fact that the condyle is assymetrical in form, that attention is not focused on the center of rotary motion. Dentistry has designated an imaginary line connecting the centers in vertical movement as the hinge axis. This line is utilized to ascertain the arc of movement in this direction.

Actually, establishing centric relation is the orienting of horizontal centers of

1. Lucia, V. O. Personal communication.

motion which are identical with the vertical centers of rotation to the maxilla. When this is accomplished, it should be seen readily that there is a common meeting ground for all the opposing occlusal anatomy. This in itself provides a terminus to the chewing stroke which is acceptable to the whole mechanism. From a mechanical viewpoint, the registration of centric relation in conjunction with the hinge axis links the rotational axial centers to the maxilla and mandible. This enables the dentist to supply opposing occlusal surfaces that function without clashing. By so doing, the lateral components of force are minimized and are dissipated vertically or nearly parallel to the long axes of the teeth.

Physiologically, the masticating forces are spent in a circumjacent manner over all the root region and not in a localized direction.

For further clarification, the term "centric relation" or "centric," as it is more incorrectly called, will be analyzed. Dentistry employs either term when there is a condylar centricity coupled with an exacting occluding tooth anatomy.

Condylar centricity is interpreted as involving both condyles in their simultaneous, unstrained terminal fossae relationships. The mandible is said to be capable of producing consistent and identical arcs in exacting vertical rotary movement when the condyles are in this relationship. This knowledge is most essential in the problem of correctly relating the mandible to the maxilla and provides the clues to its successful accomplishment.

Centric occlusion pertains to the accurate static apposition of the occlusal surfaces. In addition, centric relation may be thought of as a status of equilibrium involving the teeth, muscles and joints. In equilibrium there are no resultants and the dental inferences from this fact are as follows:

1. Since centric occlusion is a terminal relationship, it is the end of the chewing stroke and all masticatory forces have been dissipated.

2. The dispersion of those forces occurs without overloading any region such as the teeth, the bone adjacent to the teeth, or the joints. All this is in line with the philosophy of the nondisturbance of the nuclei of cells.

If analysis is made of the physiology of hinge dynamics in mastication, the importance of centric occlusion again is emphasized. Translatory and rotary motion carry the jaw downward and forward to a lateral protrusive position on the working side. The degree of jaw opening and the distance it moves laterally are governed by the amount and type of food to be crushed as well as the resistance offered by the food.

In the actual crushing stroke, the working condyle is directed to a fulcral seat about which vertical and horizontal rotation occurs toward centric position.

Granger[2] has given the term "centrodynamic path" to this rotation and this path includes the Bennett movement when one is present.

In some jaws, the registration of centric relation can be a trying and precarious task—precarious in the sense that the correct fulcral seat is influenced by past habits, cuspal premature contacts and the proprioceptive nerve reflexes. "Past habits" refers to the tendency of the condyle to rotate and translate simultaneously. On the other hand, once centric relation is correctly established, it becomes a constant.

In instances where the only dentistry to be completed is the restoration of edentulous regions, it is sound practice to strive for centric occlusion by eliminating the premature contacts by grinding. This is not to say that all eccentric tooth relations may be forgotten. Here again it must be pointed out that the ideal situa-

2. Granger, E. R. Private papers.

tion is to have complete control of all occlusal and incisal surfaces. Those who believe that accurate tooth contact in any jaw relation can be produced by tooth grinding would be well advised to attempt the same on models on any articulator capable of rotary and translatory movements.

Experience has shown that a knowledge of hinge physiology and hinge positioning is more valuable than any known technics. The inexperienced might find the following suggestions to be helpful in registering centric occlusion.

1. Sufficient time should be spent coaching the patient as to how jaw relationship is registered. It is helpful and informative for the dentist to demonstrate with his own jaw.

2. It should be explained that only rotary motion is wanted in the opening and closing movement. Tapping contacts should be avoided as they lead to the patient directing and controlling the desired relaxed jaw swing.

3. Procedure for model articulator mounting:

A. The patient is instructed to close his mouth with the teeth slightly separated.

B. The jaw is grasped by placing the thumb on the symphysis and the forefinger under the chin.

C. The jaw is shaken lightly to see if it is relaxed.

D. If it is relaxed it is pushed backwards until it feels as though the condyles are lightly braced in the fossae. By no means does this imply a forceful and strained physical condylar fossae contact.

E. The patient is instructed to open and close about five times and notice taken that the patient is producing a strict hinge motion. This repeated rotary movement is necessary to help position the condyles in their correct fulcral seats and not in their physiological rest relations.

F. When rotary motion is produced, the patient closes his jaws lightly in the bite relation media which is usually soft wax.

G. Repeated light closing contact is made without the teeth going through the wax.

A preliminary procedure prior to final remount is recommended as follows:

1. The usual patient coaching precedes all registrations.

2. Kerr's 30 gauge green casting wax is cut into strips and pressed over the posterior teeth.

3. With the condyles correctly positioned, the rotary motion is begun. The patient is instructed to make a light tooth wax closure gradually and not to squeeze beyond the initial contact. If the jaw travels through the primary tooth wax contact, a wrong superior-inferior maxilla-mandible relation will be registered. This will result in changing the fulcrum of the movement from the hinge to the prematurely contacting tooth. The effect will produce an overloading of the masticatory forces on the prematurely contacting teeth and consequently these forces will not be distributed in the joint and all the teeth. By the same token, if the closure ends in a skid from the premature point to a full occlusal contact, the traumatic damage is manifested in those areas where the slide ends.

4. Examination of the wax strips will reveal the premature contacts. These are eliminated by grinding the fossae and marginal ridges.

The final remount procedure is as follows:

1. All castings should be cemented into position by a thin mix of temporary cement and all bases, when present, should be dusted with denture adhesive powder in order to establish a casting tooth constant as well as a base mucosa constant.

2. A three sheet wax wafer is made up of two sheets of S. S. White Tenax wax and one of Kerr's. This is placed in the mouth with the Tenax wax toward the upper teeth.

3. The patient is instructed to close the mouth with the jaw in its fulcral seat and in a relaxed state. This act should produce accurate prints of the upper teeth and establish an upper tooth wax constant. The wafer is removed from the mouth and water-chilled.

4. A light dusting of a denture adhesive is applied to the upper side of the wafer and Alu wax is melted on the lower side. The wafer is returned to the mouth and the patient is asked to repeat the routine opening and closing movements.

5. It is always advisable to stand facing the patient and not to one side in order not to endanger correct condyle seating.

6. Confirmation of centric relation accuracy is obtained by registering two or more identical bites.

7. Finally, the patient, with the chilled wax record in position, must be able to open and close the jaw consecutively and voluntarily into the wax prints.

This procedure will lead to a uniform distribution of masticatory loads over the maximum number of tooth contacting surfaces, thus completing one more step toward the over-all objective of partial denture prosthesis.

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A discussion of interocclusal records

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There are many and varied causes for failures of complete denture replacements, some of which, such as technical procedures, which are, or should be, under the control of the operator. There are others, such as the inherent inability of the patient to control the dentures or become adapted to their use and function, over which the operator has no control, and which in many instances preclude the possibility that the dentures in question will ever be pleasingly successful ones. It is, however, quite generally accepted that although a patient may wear dentures that are technically and mechanically incorrect in some respects, failure is inevitable if they are constructed to a faulty centric relation. It is generally understood that a great many dentures fail because the operator does not recognize the proper positional relation of the mandible to the maxilla or, recognizing it, does not place sufficient import on obtaining such a proper relation.

The subject of occlusal records and all of the phases and ramifications associated therewith has been discussed many times. In reviewing the literature, many technics and methods were found for securing occlusal records, a number of them probably used by an individual or by a small group but not generally accepted by the profession. There are other technics and methods that are rather universally accepted and, although not in general use, their theory is generally accepted and is basically sound. The writer wishes to have it clearly understood that many of the statements contained in this paper are the thoughts and expressions of others, some of whom may not be included in the bibliography, and that

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credit is due to many persons who have contributed their thinking on the subject.

There is considerable disagreement within the profession as to what occlusal records are necessary for the successful construction of complete dentures. There is, however, one point of agreement on which everyone seems to be in accord: that dentures must be constructed with an acceptable centric relation record. It may be well to define what is meant by "centric relation." *The Glossary of Prosthodontic Terms* defines centric relation as "The most retruded relation of the mandible to the maxilla when the condyles are in the most posterior unstrained position in the glenoid fossae from which lateral movements can be made at any given degree of jaw separation."

In order that a centric relation record be acceptable, not only must the condyles be in "the most posterior unstrained position in the glenoid fossae" but there must also be equalized pressure exerted by the bases on the bearing area of the residual ridges, or a premature contact will result. It must be understood that whereas the anteroposterior positioning of the mandible may be correct, the record is of little value unless the pressure is equalized and properly distributed over the bearing area. One other factor should be considered: no forces should be exerted on the patient's mandible to assist in guiding the patient in making and obtaining the record. The closing of the mandible, by the patient, into the "most posterior unstrained position" is to be accomplished as a voluntary muscular movement.

VERTICAL DIMENSION IMPORTANCE

In the absence of a hinge axis registration, it is necessary that the centric relation record be made at the vertical dimension which will be used to complete the dentures. As many dentures are made without a hinge axis registration, it is of paramount importance that the vertical dimension be established correctly before making the centric registration. The necessity for a hinge axis registration for the construction of complete dentures has not been demonstrated, and its use is also questionable. In some instances, it is extremely difficult to register a hinge axis.

Thompson states:[1]

> Reference is often made to the vertical dimension of the face, but actually there are two vertical dimensions to be considered—one when the teeth are in occlusion, the occlusal vertical dimension and the other when the teeth are separated and the mandible is at physiological rest position, the rest vertical dimension. . . . The difference in the two face heights should be approximately 2, 3, or 4 mm. and this is the average allowance for the freeway space or interocclusal clearance that exists between the mandibular and maxillary teeth when the mandible is at rest position. If the concept that the rest position of the mandible is dependent on the balance of its musculature is true, then abuse of this principle in any of the phases of dentistry should have undesirable results. . . . If the mandible is carried by artificial restorations to a position beyond that of physiologic rest, it will return to this position at the expense of unnecessary resorption of the supporting bone. It is essential, when determining the occlusal vertical dimension in restorative procedures, that the concept of a stable rest position be present in the mind of the operator and that it be applied in a practical manner. The most important step in any such technic is to understand the physiologic basis of rest position and to know that it is present.

Centric relation must be assumed to be transitory since the registration depends on voluntary muscular action and muscle tone which may be found to vary over relatively short spans of elapsed time. There is then a need for the rechecking of centric relation in the completed dentures when suspected changes in muscle tone may have occurred. This will require a new centric relation record, the remounting of the dentures on the articulator, and the correction of the occlusion in the position the dentures have

1. Thompson, J. R. Concepts regarding function of the stomatognathic system. J.A.D.A. 48:626 June 1954.

assumed in the course of muscular readjustment.

There are two schools of thought regarding the movements of the mandible during the mastication of food and other functions. One group believes that the occlusion need not be "balanced" for eccentric movements whereas the other believes that the occlusion should be balanced for lateral and other movements. For those in the first group, a proper vertical dimension and a correct centric relation record will satisfy their needs. Those in the other group, where a balance of occlusion is considered desirable, will need three additional occlusal records besides centric: protrusive and right and left lateral. Here, too, the type and adaptability of the articulator used will be a factor in the registrations required. For example, if a two-dimensional articulator is used, such as the Hanau Model H, a protrusive record only is needed, as the lateral registrations are made according to a formula which may or may not be accurate or correct. To be practical, however, they can be considered of sufficient accuracy for the construction of satisfactory dentures as the articulator is in fairly general use. If a fully adjustable or three-dimensional articulator such as the Stansbery articulator is used, protrusive and right and left lateral check-bites are necessary in addition to the centric registration.[2]

It is not possible to make acceptable occlusal records unless a good reproduction of the residual ridges has been obtained. The bases made on these casts must be fitted accurately, and be rigid and well stabilized. Bases made of metal or acrylic resin are most desirable. All other types leave much to be desired. Shellac bases, if used, must be properly reinforced and care taken to prevent the possibility of warpage. The shellac bases must be stabilized further by means of some type of lining material in order to provide for a more accurate fit to the ridge region. The time and effort expended in the stabilization of the bases to be used for obtaining occlusal records must be considered well spent. The lack of well stabilized and accurately fitted bases means subsequent faulty records and almost inevitable denture failure.

There are several technics and methods by which stable bases can be developed. Often a combination of methods can be used, depending on tissue and ridge conditions. Cast metal bases, particularly on the mandibular ridge, can be used in conjunction with acrylic or shellac bases on the maxillary ridge. The cast metal base, either of gold or chrome alloy, is later used for the lower denture base. Acrylic bases can be made directly on the cast after lubrication and blocking out of undercuts. Care and judgment must be used in selecting the type of base used as the cast can be damaged. The acrylic base can be made slightly oversize by the use of a wax spacer. After bench curing, the periphery is trimmed carefully so as to be short of the area to be covered, and the acrylic base is then lined with one of the materials available for that purpose. This method precludes the possibility of damage to the cast during the removal of the acrylic base. If a tray of self-curing acrylic material is used to form these bases, the addition of one fourth part of plaster of paris to the acrylic material will avert the tendency to shrink and rebound during the curing process; the addition of plaster of paris to the acrylic resin does not noticeably affect the material for the use for which it is intended.

TECHNICS FOR RECORD-TAKING

In general, there are three accepted technics used for securing occlusal records: (1) the arrow point tracing technic using the movements of the mandible to scribe a record of the movements; (2) the func-

2. Stansbery, C. T. Functional position check-bite technic. J.A.D.A. 16:421 March 1929.

tional method usually called the "chew-in" method, and (3) the direct check-bite method using wax or other recording material.

The arrow point tracing method[3] consists essentially of a graph plate which may be attached to the mandibular or maxillary base or to the occlusal rim and one or more styluses attached to the opposing base or occlusal rim. Generally a central bearing point is used to separate and maintain the opposing bases at the proper vertical opening. Usually this opening is determined previously and the tracing devices are adjusted to the proper position on the articulator to which the prosthesis has tentatively been mounted. Devices are available that enable the tracings to be made intraorally or extraorally. There is, however, little advantage in using a device which records the tracing inside of the mouth, within the denture region, where the progress of the tracing cannot readily be observed and where, in order to see what is happening, the procedure must be stopped and the patient must open his mouth from time to time so that the operator may note the progressive generation of the path of the tracing. The extraoral tracing device is easier to use, and the development of the tracing can be observed readily at all times. Its use is also less time-consuming, for when a path has been generated the operation can cease and the bases can be locked in position.

A properly generated path showing a distinct apex is an accurate indication of the centric relation position. The locking of the bases in position, usually with a quick-setting plaster injected between the bases, is a simple and accurate method of obtaining the record. If protrusive and lateral records are made, the same method and technic is used. The technic has, however, one distinct disadvantage that is, in many instances, difficult to overcome. To locate the central bearing point in the exact center of both the mandibular and maxillary bearing regions is frequently impossible, and as a consequence the equalization of pressure while making the record is highly improbable. Even in those mouths where the ridge relationship is excellent or as nearly normal as a jaw relation can be, it will be found that an equalization of pressure will be lacking on those ridges having soft movable tissues or on those flat lower ridges where there may be a movement of the denture base.

Kingery[4] adequately and graphically describes the functional method of recording central occlusion when he states,

> The functional registration method, frequently called a "chew-in," is a procedure, as the name implies, of letting the patient indicate the position of centric relation by functional movement. This procedure is accomplished with abrasive material on the opposing occlusal rims, wax between the occlusion rims, or by the use of studs which cut Gothic arch [or apex tracing] patterns in the opposing occlusion rim. It is a method with many good points, but, like all the others, it is not infallible, but is dependent on the intelligence of the user. . . . Its advocates claim the patient makes his own recordings; [however,] . . . the operator must possess a clear concept of that which he seeks to accomplish. The ability of the operator to determine when the record has been carried to a successful completion is extremely important. The danger of perpetuating a habit is present in some cases. . . . [This] record, as are others, is very dependent on the bases on which it is made or on the stability of the underlying tissues. It also requires a high degree of patient cooperation. The record is developed under some pressure, and the correctness of the registration and of the various factors involved must be closely checked and verified by the operator.

This technic promises much, and the idea of using the mouth as an articulator and developing a functional occlusion is intriguing. If the records could be made accurately, the technic would fulfill the requirements.

3. Trapozzano, V. R. A comparison of the equalization of pressure by means of the central bearing point and wax check bites. J.A.D.A. 38:586 May 1949.

4. Kingery, R. H. A review of some of the problems associated with centric relation. J. Pros. Den. 2:307 May 1952.

In the direct check-bite method, the operator by manipulation, repeated trial and observation, attempts to have the patient close his jaws in a position of centric relation. It seems to be the method more universally used than either of the others. Many materials—wax, plaster, compound, zinc oxide-eugenol paste—may be used as the interposing media when this method is used. It has the advantage of a more certain means of obtaining equalized pressure on the denture bases, and it provides a method of readily rechecking the record obtained so that the accuracy of the record may be verified. The technic may be used for the preliminary record, for the centric occlusion registration, for final check before completing the dentures, for lateral and protrusive check records, and later to remount the completed dentures for an occlusal check when muscle tone and denture position have been established. The disadvantages are that the operator must develop the ability to use the method easily and accurately and he must be able to detect and correct errors of technic and judgment. It is necessary to make the occlusal recording in the finished dentures at a slightly increased vertical dimension; this, too, is necessary in other methods in order to avoid cuspal interference.

CHECK-BITE METHOD

A method in use for many years embodying the principles of the check-bite method has proved practical in a complete denture practice. The bases used are either shellac baseplates or acrylic bases made slightly oversize and in either instance stabilized, usually using one of the zinc oxide pastes made for that purpose only, not an impression paste. The bases are not stabilized until a preliminary mounting has been made on the articulator.

Occlusion rims made of wax are used to obtain a preliminary centric relation record in order to mount the prosthesis on an articulator. The rims are carefully trimmed and contoured, and the bite is equalized as much as possible by trimming and softening the wax rim. The vertical dimension is adjusted, allowing for a freeway space of approximately 6 mm. or more. This large amount of freeway space compensates for the equalizing wax placed between the rims and provides the latitude desirable when the interocclusal space is definitely adjusted prior to obtaining the final centric occlusal registration. If a face-bow is used, it is now fastened to the lower rim and this rim is mounted on the articulator. A groove about 3 or 4 mm. deep is cut along the center of the lower rim from the distal aspect on one side around to the distal aspect of the opposite side. Softened equalizing wax is placed in this groove, permitting an excess of several millimeters. The occlusal surfaces of each rim are warmed slightly, the rims are placed in the mouth, and the patient is instructed to close retrusively, thus compressing the soft equalizing wax slightly. The rims will adhere to each other. They are then removed from the mouth and the mounting to the articulator is completed if a face-bow was used, or the prosthesis may be mounted on completion of the preliminary registration.

The teeth that have been selected previously are now arranged on the baseplates. All of the mandibular teeth are set up, and the six maxillary anterior teeth are also arranged in the arch. An occlusal rim of wax is interposed in the place of the upper posterior teeth, maintaining the bite opening originally accepted.

At this point, the bases are stabilized using the pressure of the closing articulator to seat the bases on the casts and stabilizing one base at a time—the maxillary first, then the mandibular. The occlusal rim is adjusted to accommodate for the slight shift occurring in the bases because of the added material. The stabilizing material is trimmed, the ex-

cess removed, and the dentures are ready for the occlusal registration.

At the next visit of the patient, the vertical dimension is carefully rechecked and necessary corrections made. Softened wax is added to the occlusal surface of the upper rim, posterior to the six anterior teeth, and the patient is permitted to close his jaws in a relaxed position. The prosthesis is then checked and rechecked, for vertical dimension, for centric position and for an equalization of pressure; any lack of such equalization is plainly evident on the occlusal rim. The indentation of the lower posterior teeth in the softened wax of the upper occlusion rim should be shallow, well defined and of an even depth on each side. Care should be exercised to maintain the vertical dimension decided on as correct. There should be no evidence of sliding, and the wax surface should show a well-defined negative imprint of all of these teeth.

The maxillary cast is now remounted on the articulator to the registration obtained. All teeth usually are rearranged to make the esthetic corrections noted in the preliminary arrangement.

When the patient returns for the try-in of the teeth set up in wax, the dentures are rechecked again for vertical dimension, for centric relation and for tooth arrangement. Check-bites are taken in equalizing wax in the protrusive and lateral ranges and the articulator adjusted to the check-bites so obtained. In the event that there is a discrepancy in the centric record, the posterior teeth are removed, the centric position easily re-registered, the maxillary cast remounted, and the posterior teeth reset.

After the dentures are processed, they are remounted on the articulator on the casts of the original mountings which have been retained. The occlusion is corrected and perfected and the dentures completed.

Occasionally after a 30-day period, the dentures are remounted to a new wax bite, or plaster is injected into the buccal surfaces of the dentures which are held in light occlusion, and the prosthesis remounted on the articulator for a correction of the occlusion which often provides for greater comfort and efficiency of the dentures.

A basic knowledge of the principles involved in prosthetic dentistry is necessary to render a complete denture service. It is necessary to have knowledge of all phases and strive for perfection in the over-all picture rather than in any one part of the process. Having that knowledge and knowing the limitations imposed, a more complete and adequate service can be rendered to the denture patient.

The Era of Revolutions • Those who have weathered the first half of this twentieth century may well be excused if, looking back rather breathlessly, they feel that this period stands out in history as a half-century of revolution—revolutions in politics, economics, natural and applied science, arts of healing and technics of destruction. These changes are always associated with revolutions in moral and ethical standards. What may have escaped their observation is that they have lived through one of the most beneficent revolutions in the history of mankind—a revolution in psychology, in the science of the mind. It is a revolution that promises to explain not merely why man develops mental disorders, but why he creates such peculiar political institutions, devises sane, or as the case may be, crazy economic systems, turns ethical standards on their heads and encourages revivalist crusades. Why he prepares to blow millions of his fellow creatures to fragments at the same time as he proposes to inoculate millions of children against bacteria and viruses. *Edward Glover.*

Work simplification: an application to dentistry

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Members of all professions worthy of the designation must work constantly to extend their knowledge through research and study; to improve their technical skills, methods and equipment, and to gain greater competency in dealing with the situations and conditions requiring their services. In many instances advances in one professional field are aided by principles, methodology, or analysis technics developed in other disciplines. Recognizing this, an objective study was conducted to determine the extent to which the technics of work simplification could be applied to the general practice of dentistry.

Work simplification is utilized a great deal in industrial activity. It can be described most simply as an organized effort to find easier ways of doing work. This natural and common concern immediately encounters the basic principle that to improve any operation or procedure requires change. At this point two problems arise: one stems from the knowledge that all changes do not necessarily create improvements; the second problem is the inherent resistance to change in everyone and everything—particularly when the forces tending to create the change come from an external source.

The work simplification approach as used by industry has been formulated to solve these problems by using a systematic analysis that insures that the changes created will produce the desired improvement and minimizes the natural resistance to change. This is done by substituting internal desire for creating improvement for external pressure to make the change. In practical application the benefits of this approach have been remarkable savings in time, material and energy. To obtain the desired results, certain analysis technics and methods have been developed, the nature of which is so fundamental that they have been applied to many different types of work—manufacturing operations, clerical and office routines, department store activities, hospital operating room procedures, and others.

Because of the applications of these technics to widely divergent work activities, the purpose of this preliminary study was to investigate the possibility of applying certain work simplification procedures to various aspects of the typical dental office activities. If these highly individual activities could be analyzed systematically, extended studies would suggest means whereby individual dentists or groups could develop and improve the effectiveness of their operations.

THE FIVE STEP PATTERN

The development of a better method involves following certain steps that are the most likely to produce improvement. They are:

1. Selection of the job or activity to be studied.
2. Collection of data and information regarding the selected job.
3. Questioning of everything affecting the performance of a job.
4. Development of possibilities for improvement.
5. Evaluation of results and installation of improved method.

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In Step 1 it is necessary to determine the relative importance of each portion of the procedure being studied. One measure of relative importance is the percentage of total time spent on a given type of activity. By focusing attention and further study on the high time percentage activities, some assurance of maximum possible savings is obtained. Since all work involves a certain amount of "make ready" or preparation time, "do" or actual execution time, and "put away" or clean up time, refinement of the data-collecting process in this step can indicate in quantitative measure the potential savings for each activity. In order to establish the limits for a study it is necessary to find out what needs improvement most.

Knowing this from Step 1, more detailed analytic procedures can be applied to the critical job activities selected for study in Step 2. These analytic technics involve the collection of data and information regarding the selected job and the construction of charts to record in detail all the elements of work which comprise the present way of performing the job. The mere recording of these data permits the classification of the elements into categories of those which contribute directly to the purpose of the activity and those which are auxiliary, incidental, or unnecessary.

In breaking the job down and recording data regarding it, use is made of a number of special charts. Originally developed by the Gilbreths, these charts make use of subdivisions of activity identified as:

Operations
Transportation or moves
Inspections
Delays
Storages

Each of these is represented by code symbols to permit easy notation, classification and analysis.

In Step 3 a pattern of questions in the form of a check list is directed to each element of the job to establish the general possibilities for improvement. The basic questions on which these check lists are developed are simply expressed thusly:

What is the purpose of this operation? How is the operation performed? Who performs the work? Where is the work done? When is the work done?	Why?

The persuasiveness of these questions should not be minimized. In practical application they become the key to an almost endless check list of questions which can be applied to the body motions required to perform the operation, the arrangement and layout of the work area, and the design of the instruments, tools and equipment used. A typical expansion of the basic questions into a check list to be applied to a particular activity follows:

1. Can any operation be eliminated, combined, shortened, or made easier?
   a. As unnecessary
   b. By changing the order of work
   c. By new or different equipment
   d. By changes in the layout; by better grouping of equipment
2. Can any movement be eliminated, combined, shortened or made easier?
   a. By leaving out operations
   b. By changing the places where things are kept
   c. By shifting some operation to another job into which it fits more conveniently
   d. By changing the layout
   e. By changing equipment
   f. By changing the order of work
3. Can delays be eliminated, combined or shortened?
   a. By changing the order of work
   b. By changing the layout
   c. By new or different equipment

The purpose of Steps 1, 2 and 3 is primarily that of gathering specific data regarding a well-defined work activity and recording them in a form that facilitates analysis and evaluation. Objective measures of performance are obtained and

made a part of the data. Having these data and answers to the check list questions permits determination of what aspects of the work are worth further study and what direction such study should take. Following these steps, using specially designed procedures and forms, is essential to the proper consideration of all possibilities for improvement.

CREATIVE ASPECT

Thus far, the work simplification approach has been historical—a recording of what has been done in the past. The creative aspect of work simplification begins with Step 4. At this point it is possible to work with facts, not opinions; work on causes, not effects, and work with reasons, not excuses.

Basically there are four actions that can be taken to create better methods. They are to:

Eliminate
Combine
Change sequence
Simplify

Eliminate • The answers to the basic question "what" help to determine the possibility of eliminating an operation. Many operations are studied for improvement that should be eliminated instead. Could a change in the preceding or succeeding operation eliminate the need for this particular operation?

Combine • The answers to the questions "where," "when" and "who" lead directly to improvements by combining operations. Whenever two operations are combined, the moves and storages and delays between them are eliminated. The time required to complete the two combined operations is usually less than the total of the time required for each operation separately.

Change Sequence • The answers to the questions "where," "when" and "who" may lead to further improvements by changing the sequence of operations. Further eliminations and combinations may be possible. Perhaps another operator could perform a given task better, freeing time for more productive work.

Simplify • After completion of every elimination, combination and change in sequence, it is time to develop "how" the job should be done. This is the last phase of development and should be applied after all other steps have been completed.

As an aid to simplification, a study of the principles of motion economy is helpful. Frank and Lillian Gilbreth divide these principles into three groups: (1) Body Motions; (2) Work Place, and (3) Tools and Equipment.

These can be summarized and condensed into the following guides:

1. Simultaneous, symmetrical motions should be used wherever possible.
2. Tools and materials should be prepositioned whenever possible.
3. Materials and tools should be located to permit the best sequence of motions.
4. Tools, materials and controls should be located within the normal working range of the operator.
5. The height of the work place should permit alternate standing or sitting by the operator.
6. Layout of equipment and materials should reduce excessive travel or move time.
7. Handles on tools should be designed for the particular job application.
8. Provision should be made for adequate illumination without inducing excessive eye fatigue.

Adherence to these principles minimizes waste motion and effort and contributes to more effective methods and procedures of benefit to the patient and dentist.

Step 5 involves the testing of the improved method under representative conditions. To compare the improved meth-

od with the old method requires objective evaluation rather than subjective impressions. Collection of data regarding method of performing the improved procedure or operation, time for performing the new procedure, effect on patient and dentist, and so forth, should be done in the same manner as Step 2. Comparative values and relative improvement can be determined and the effectiveness of the improved method established.

This five step pattern is basically the traditional scientific method with some modification to suit the area and type of application. Other procedures based on the same fundamentals may be used with equal success.

It would serve here to mention a study made by various divisions of General Motors working closely with the Process Development Section of the General Motors manufacturing staff. In line with a constant effort to improve and set up operations keyed to the physical capabilities and limitations of the human factor in the design of man-machine systems, they conducted studies of the operators' psychological and physiological mechanisms.

Normal work space desirability usually involves minimum movement, which means that the shorter the distance of a movement the less will be the operator fatigue and the time requirement. The scope of the physical dimensions of the various operators must be considered in the design of an optimum work space area. In the General Motors study the shoulder pivot points are used to plot the maximum operator work areas at various elevations (Fig. 1).

With the dimensional boundaries of the operator's work space having been defined and established, it is possible to establish the manual operations to be performed within the work spaces.

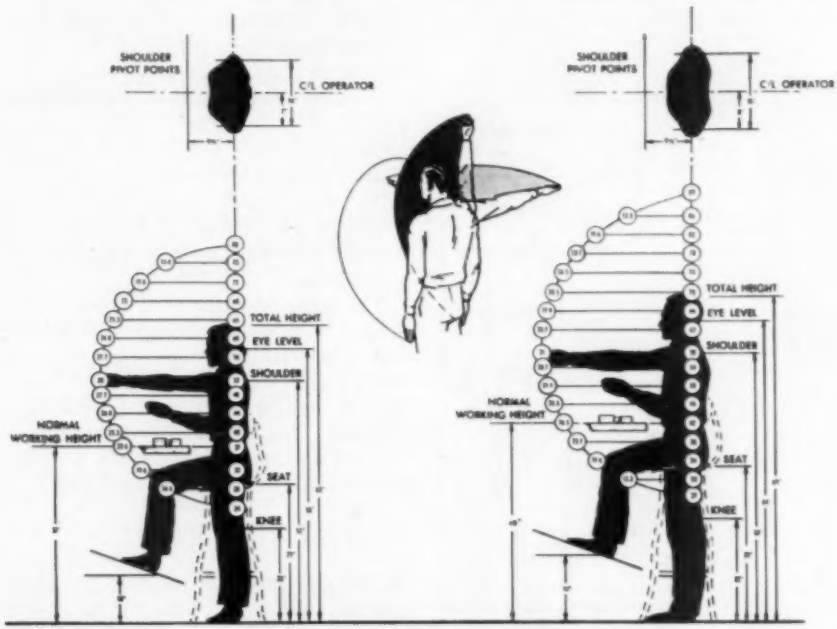


Fig. 1 • Maximum operator work space

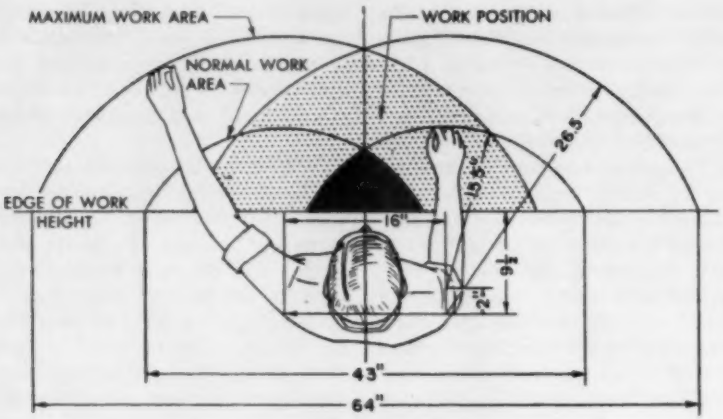


Fig. 2 • Maximum and normal work space—plan view

In dentistry the total space generally may be said to include the unit, chair and cabinet. There certainly is room for spread in that the individual dentist varies in his placement of supplies and auxiliary equipment and site of sterilizing activities. There is normally a breakdown of operator work space as follows:

1. Maximum available work space equal to the volume circumscribed from the minimum limb flexion to the maximum limb extension of an operator.
2. Maximum normal work space equal to the volume circumscribed by the movement of the fully extended arm moving about the shoulder pivot.
3. Normal work space equal to the volume circumscribed by the horizontal forearm pivoting about a relaxed vertical upper arm.

The most desirable work space is the normal work space segment. The allocation of operator space generally is established on the basis of the physical dimensions of an average sized male or female operator. Plan and side views indicating the average dimensions used for the male operator are shown in Figures 2 and 3.

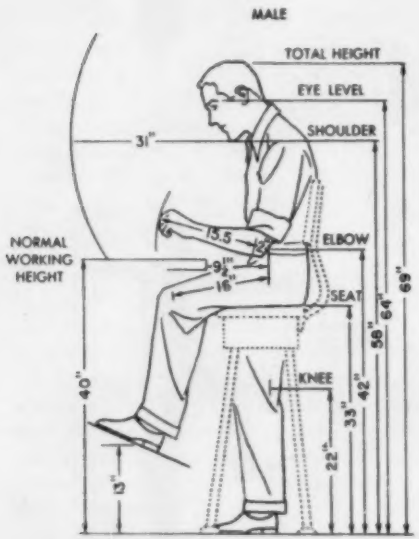


Fig. 3 • Dimensions of average operator—side view

DENTAL APPLICATIONS

About eight years ago a preliminary study was conducted in the offices of ten Cleveland dentists in an effort to determine the possibility of applying certain work

simplification principles to dental office practice. The results of the study indicated the probable effectiveness of the method and it was decided to extend the scope of the study. As a result of this preliminary study interest was stimulated among the members of the Ohio Academy of Dental Practice Administration and a larger group of dentists agreed to contribute data to the project. All participants were engaged in a general practice of dentistry. In order to visualize the types of practice contributing data to the Ohio Academy study, Table 1 regarding the group may prove to be helpful.

The objectives of the extended study were:

1. To determine the relative amount of time spent by the average dentist on each phase of office dentistry.
2. To indicate the phases of office dentistry to which further methods analysis and work simplification would be applicable.
3. To determine the relative distribution of time devoted to preparation, productive activity in the oral cavity and clean-up.
4. To provide constructive information to aid the dentist in determining the optimum methods and procedures for his own practice.
5. To provide a means of evaluating the potential benefits resulting from better methods and procedures.

CATEGORIES OF ACTIVITIES

Following the five step pattern, the first step was to find out the amount of time spent in the various activities of the general practice dentist's work day. From this information a relative measure of the importance or value of each category of work performed was obtained, and, accordingly, decision made as to which activities should be subjected first to the remainder of the work simplification procedure.

Common dental office activity was divided into categories. Obviously there is some overlapping of categories and there may be some ambiguity but for the purpose of accomplishing Step 1 these were considered to be noncritical.

Categories • For this analysis, common dental office activity was divided into the following categories:

1. Oral examination—mirror and explorer.
2. Diagnostic examination—study models, pulp test, and so forth.
3. Operative dentistry—all operative procedures concerned with the repair of the tooth, excluding root canal preparation.
4. Fixed bridgework—all procedures concerned with fixed replacements.
5. Partial denture prosthesis—all procedures concerned with removable replacements.
6. Full denture prosthesis—all procedures concerned with total dentition replacement.
7. Radiology—roentgenograms; taking, developing and reading.
8. Surgery—extraction of teeth, tissue and growth removal, root resection, and so forth.
9. Postoperative care — suture removal, packs, and so forth.
10. Periodontics—all procedures concerned with the regions surrounding the tooth.
11. Endodontics—root canal therapy.
12. Prophylaxis.
13. Consultation—case presentation.

Table 1 • Members of the Ohio Academy of Dental Practice Administration who contributed data to this study

No. of operatories—1	6 dentists
2	11 "
3 or more	20 "
No. of assistants—1	12 "
2	14 "
3 or more	11 "
Hygienist	22 "
No hygienist	15 "
City size—under 10,000	11 "
10,000–50,000	6 "
50,000–100,000	4 "
100,000 and over	16 "
Rent office	28 "
Own office	9 "
Location—suburban	21 "
downtown	16 "
Years in practice—up to 3 years	3 "
3 to 8 years	7 "
8 to 16 years	10 "
16 to 24 years	17 "

14. Emergency.
15. Broken appointment—wasted time due to broken appointment only.
16. Relaxation—planned break in activity, actual resting.
17. Diagnosis—studying the data of a case.
18. Instructions to auxiliary personnel.
19. Telephone—dental business only, such as instructions to dental laboratory.
20. Instructions to laboratory assistant—for dentists having own laboratory man.
21. Outside business—performing functions that have no direct relationship to dental practice; letter writing, committee work, and so forth.
22. Education of patients—demonstration and talk that is not within the consultation period.
23. Obtaining facts—taking a history or gathering information pertaining to the patient.
24. Laboratory—performing various laboratory functions.
25. Idleness—forced break in schedule not filled with any other category.
26. Preventive dentistry—fluoride treatment, diet consultation, and so forth.
27. Orthodontics.
28. Prescription and medication service.
29. Bookkeeping and clerical procedures.
30. Miscellaneous—any other function not listed.

Classifications • In addition to the categories indicated, the work done in each was identified further in terms of the following classifications:

A. Make ready: preparation necessary to the performance of the category indicated, that is, obtain and lay out instruments, prepare amalgam, wait for anesthesia, and so forth.

B. Do: actual procedures involved while contact is made by the dentist with the oral cavity. Any activity wherein contact is not made between operator and oral cavity shall fall under "make ready" or "put away" classification.

C. Put away: disposition of materials, instruments, and so forth, representing clean up.

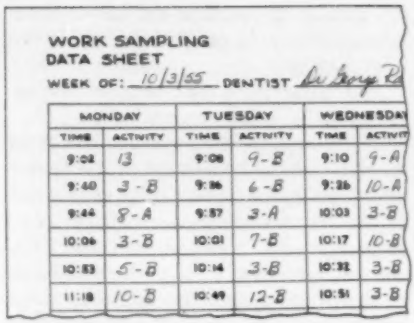
The use of these classifications of the various categories of activity was necessary to establish the relative productive time of the dentist and give a first indication of potential benefits of the methods analysis that will follow.

Making use of the categories and classifications given, it was possible for the dentist or his assistant to identify properly his activity at any given time. For example, at a given moment the dentist may be preparing to make an emergency extraction. This activity would be identified as "8-14-A." The first number indicates the basic nature of the work being done, the second number refers to the conditions under which the operation was performed, and the letter designation indicates that the "make ready" portion of the procedure was occurring at that moment.

Assuming that the categories are representative of those areas of activity normally taking place in the average dental office, and that such activities may be divided into a sequence of "make ready" "do" and "put away" operations, a single category number or a combination of category numbers and activity classification letters permitted an identification of the specific work being done at any time.

A statistical sampling procedure was used to establish the distribution of work load existing in the average dental practice. This technic is a quick means of establishing the frequency of occurrence of each of the categories listed and, accordingly, the amount of time spent in each office on such activities. This information can be accumulated without taking any unusual time on the part of the participating dentist and does not require any tedious or lengthy recording of the required information.

To facilitate, for all participating dentists, the process of gathering the necessary data, a form was provided which listed a number of times for each day of the week. The times indicated are random. They were purposely distributed so that no semblance of a regularly reoccurring pattern is present. There is no significance to any individual time shown; if a time is listed as 10:18, it might just as well be listed as 10:14 or 10:23.



WORK SAMPLING
DATA SHEET
WEEK OF: 10/3/55 DENTIST Dr. Jerry R

MONDAY		TUESDAY		WEDNESDAY	
TIME	ACTIVITY	TIME	ACTIVITY	TIME	ACTIVITY
9:02	13	9:08	9-B	9:10	9-A
9:40	3-B	9:36	6-B	9:26	10-A
9:44	8-A	9:57	3-A	10:03	3-B
10:06	3-B	10:01	7-B	10:17	10-B
10:53	5-B	10:14	3-B	10:32	3-B
11:18	10-B	10:49	12-B	10:51	3-B

Fig. 4 • Work sampling data sheet

The recommended procedure was to have the record completed by the office assistant. She asked or observed, at the time indicated on the form, the specific nature of the work being done at that moment and recorded the activity in terms of the category numbers and classification letters listed. A sample form is shown in Figure 4.

Over 22,000 random readings were obtained. These were tallied and statistically analyzed and the results obtained are shown in Table 2.

The figures in the table were averages for the group. In addition to these figures, the percentage for each category was obtained for each dentist so that he could compare his practice with the group average.

There is a limitation in this technic in that there was probably some error in the individual dentists' interpretation of the categorizing of specific activity. However, certain general situations were indicated which could be of value in further study. Utilization could be made of the same random sampling technic or by limiting further study to the categories showing the largest occurrences of data. It was decided to make an individual study in the field of operative dentistry showing the largest number of data. The technic utilized was memo-motion study.

Memo-motion study is the name given to the special form of motion study in which motion pictures are taken at unusually slow speed; that is, 60 frames per minute. This permits rapid visual review of an extended period of performances. When a film taken at one frame per second is projected at the normal speed of 16 frames per second, it permits viewing in four minutes a film of an hour-long operation. In addition to saving time, viewing with a compressed time scale frequently brings to light unusual aspects of the subject being studied and is often instrumental in developing new ideas for better methods. The study was conducted in one dental office over a period of several days. The camera was utilized only when operative dentistry was performed. It recorded the sequence from the time the patient was seated in the chair until the next patient

Table 2 • Analysis of dentists' activities from 22,000 random readings

Category	Per cent of time spent
Oral examination	4.49
Diagnostic examination	.69
Operative dentistry	38.39
Fixed bridgework	5.34
Partial denture prosthesis	2.77
Complete denture prosthesis	5.32
Radiology	3.00
Surgery	4.20
Postoperative care	.57
Periodontics	.96
Endodontics	2.23
Prophylaxis	7.96
Consultation	2.42
Emergency	.92
Broken appointment	1.42
Relaxation	4.55
Diagnosis	1.02
Instructions to auxiliary personnel	.89
Telephone	.60
Instructions to laboratory assistant	.10
Outside business	1.33
Education of patients	.71
Obtaining facts	.32
Laboratory	1.97
Idleness	1.67
Preventive dentistry	.10
Orthodontics	.11
Prescription and medication service	.03
Bookkeeping and clerical procedures	1.65
Miscellaneous	4.25

MEMO MOTION
FILM ANALYSIS DATA SHEET

DATE 4/12/56 TYPE OF OPERATION Prophy

DENTIST Dr. E. S. Burr PATIENT Mary Smith

FRAME COUNT	TIME SEC.	ACTIVITY	FRAME COUNT	TIME SEC.	
241	4	STOPS OPERATING, LEANS BACK REACHES FOR BOX OF NEW BURS	509	7	
245	7	REMOVES OLD BURS & PLACES NEW BUR	516	3	
252	10	RETURNS TO MOUTH AND CONTINUES OPERATING	519	8	
262	6	DR STOPS OPERATING AND WIPES UP HANDPIECE	527	3	
268	18	DR REACHES IN CABINET FOR HAND INSTR. & PICKS IT UP	530	5	
286	19	RETURNS TO MOUTH AND CONTINUES OPERATING	535	4	
305	2	DR PLACES INSTRUMENT ON BRACKET TABLE	539	8	
307	3	ASST HANDS DR. ANE SYRINGE	547	6	

Fig. 5 • Memo-motion film analysis data sheet

was seated. The results were studied by means of a normal, 16-frame-per-second projector and a special analysis projector. This analysis projector permits single frame viewing of the action and is equipped with a frame counter. This makes it possible to determine the dentist's actual time spent in so-called productive activity as well as individual study of his chair assistant, equipment utilization, placement, and so forth. The method of recording the data for this study was through the use of a film analysis data sheet (Fig. 5).

DISCUSSION

There are many improvements that can be hoped for regarding dental operations and procedures. The first step toward achieving them is with a positive, systematic program such as work simplification. It must be kept in mind that these studies are for the purpose of benefiting both dentist and patient, and that apparently well-intentioned efforts to improve must not result in detriment to one while benefiting the other. The use of the random sampling procedure, memo-motion study, and systematic analysis technics permits an objective rather than a subjective analysis of what takes place in the dental office. If the basic points of a check list are examined in the light of this factual information the first concern becomes the area of space in which the work is done.

The physical scope of the various operators must be utilized in the design of an optimum work space area. With the dimensional boundaries of the operator's work space having been established by the physical dimensions of the average operator, it is possible to control the manual operations to be performed within this work space. In applying these studies to dental work, evaluation must be made of the placement of equipment, instruments, cabinet heights, and so forth.

By analyzing the random sampling technic, the dentist may use the method to obtain a general picture of his own office activity. Aided by the exacting technic of the memo-motion studies, many questions might be asked: Is there a great deal of wasted motion? Is the normal work space being utilized? Are the tools and equipment in the most efficient positions? Could the entire dental unit be redesigned, keeping in mind the changes that might suggest themselves from studies in many offices?

A manufacturer could obtain an accurate idea of how the average dentist works from a composite study. New design of equipment could be developed in accordance with the idea of simplicity and psychological effect on the patients. It could be a design that would conceal the wires, belts, engine arm and other tentacles that seem to reach out to overwhelm the patient who still has a fear of dentistry. The prospective patient could walk into the dental treatment room and see only a chair and an attractive cabinet. All of the equipment could be recessed in this cabinet, where pressure on various buttons would allow necessary pieces of equipment to glide forth slowly, such as cuspidor, air and water syringes, handpiece, bracket table, and so forth. The spotlight could be foot controlled. This would allow adjustments without stretch-

ing by hand to regulate the spot to the proper position if the chair is raised or lowered—avoiding eye fatigue from improper illumination.

These are merely speculations as to what might be desired by many dentists. A systematic analysis should determine objectively the necessary and desirable features of the improved design and minimize the subjective and often emotional approach.

The application of the principles of work simplification could be used to obtain a general pattern of the entire office activity. A study could be made of the general flow of patient traffic. Where do patients enter and leave? Are there any obvious obstacles in the path of smooth traffic flow? Is the physical set-up ideal? What constitutes ideal? Is the secretary or office manager functioning in the most advantageous work space? Are her filing cabinets, supplies, telephone, desk, and so forth, in correct position?

What constitutes a good working arrangement in layout of treatment rooms in an office with multiple operatories? Some suggestions have been made in the literature that a circular arrangement saves steps and makes for better patient flow. There are suggestions that a straight line pattern is best. Others say a square or rectangular layout is ideal. This problem should be worked out scientifically with observations using the principles and tools of work simplification in a number of offices to arrive at a solution that would utilize the entire office in the maximum and normal work area patterns.

In the office of one of the authors some changes have been made since conducting these studies. The chair assistant has less movement out of her normal work area. The use of tray set-ups which are available to her in her normal work area allows her to acquire a complete clean tray set-up and dispose of a used set-up without taking a step. The author has employed an additional chair assistant who is in charge of the "make ready" and "put away" operations. The original chair assistant, who is highly skilled in working with the dentist while actual operating procedures are being carried out, is kept busy with these activities specifically. She is free to follow the dentist to another treatment room which has been made ready for dental procedures with the patient seated and waiting. The attempt at improvement always should be aimed at utilization of personnel in the job for which they are specifically trained and skilled. The tray set-up enables an operator who may be working without a chair assistant to obtain a sterile tray with all of the necessary equipment for a particular operation, utilize it and dispense with the used tray. For the next patient he can obtain another sterile set-up and at a prescribed time during the day or at the end of the day, do all of the "make ready" and "put away." These procedures are more logical than reaching into cabinets for individual instruments as the operation sequence proceeds.

Another change was made with regard to the working area of the operator and his chair assistant. There has been a tendency for dental cabinets to be placed behind the patient rather than to the operator's right. These cabinets are mobile and at various fixed working heights. The operator or his chair assistant are compelled to turn or move out of the normal work area in utilizing the cabinet behind the patient. In this case a cabinet was also placed at the operator's right. The chair assistant, during the course of an operation, would find occasion to travel from the patient's left to the cabinet on the operator's right and back to her original position. Changes were made utilizing the tray set-up plus the construction of an adjustable bracket tray in front of the patient, which could be moved in almost any position horizontally and vertically. This enabled the tray from the set-up

shelf to be placed on the bracket. It was adjusted to the optimum vertical working height and positioned horizontally so that both dentist and chair assistant could work from the area without turning or twisting. The patient, dental assistant, and dentist form a working triangle. The operator and chair assistant do not have to turn their heads from the brightly lighted working area to dark cabinets, with possible accompanying eye fatigue.

The bracket table is used as an auxiliary working surface in most cases for placement of instruments. It also is in a fixed height position. The five foot or six foot operator must utilize the bracket table equally. The operator who works from a standing position or the seated operator must also work from the same fixed position table. A change was made in regard to this detail in the office of one of the authors. Memo-motion studies showed that the operator worked mostly behind and to the right of the patient. The operator was seated at all times. Work simplification studies show that the best working area is below the elbow height for a working surface top. The fixed height bracket table was designed for a standing operator of average height. This proved to be at almost shoulder height for the seated operator.

These changes were made in order to permit dental operations in a normal work space. By the end of the day there was noticeably less fatigue than was previously caused by needless movements such as twisting, turning and reaching. Obviously many changes and improvements can be made in the pattern of work described previously.

SUMMARY

Dentists are continually striving to better their services to the patient and at the same time make their work easier. A study such as this merely opens the door to the vast field of work simplification as applied to dentistry. There is need for cooperative research and study between dentists and the manufacturers of equipment. The studies can be conducted by the individual dentist and by study groups. The workshop study group technic could be utilized effectively to generate new ideas for improvement. The workshop group should consist of men with backgrounds in such fields as dentistry, engineering, psychology, architecture and equipment manufacturing. The objective outlook that this type of study promotes can be of great aid to the manufacturer in his effort to supply the dental profession with the equipment that permits most efficient service. Significant contributions to this end can be made if dentists work with the manufacturer in a cooperative program.

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Preconceived Ideas • Preconceived ideas are like searchlights which illumine the path of the experimenter and serve him as guide to interrogate nature. They become a danger only if he transforms them into fixed ideas. *Réné J. Dubois.*

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Editorials

Prosthodontics for the general practitioner

The many favorable comments received concerning the periodontal issue of THE JOURNAL published in November 1957 prompted the preparation of this month's issue devoted in the main to another and equally important specialty—prosthodontics. Regrettably, as Charles Jamieson says in his introductory statement on page 169, all aspects of this basic subject cannot be covered in twelve short articles. It is felt, however, that the twelve articles herewith presented, each prepared by an authority in his particular field, will make a valuable addition to every general dental practitioner's working library.

Although some of this month's material may be repetitious, repetition, as Harris points out in his article on impression taking, has certain educational values, as every educator knows repetition always fixes first impressions more firmly in mind. Applying this axiom, Harris quotes Boucher, Fisher and Tilton to sum up the basic requirements of successful impression taking thereby giving the reader in one quick reading the opinions and advice of other well-known authorities.

Payne, writing on posterior occlusion, is equally succinct, informative and plain spoken, particularly on a subject now uppermost in the minds of most dentists. If dentistry, Dr. Payne asserts, is to maintain its pre-eminence in the health field, the dentist must assume full responsibility for denture planning. "He must not delude himself by letting a commercial dental laboratory do his denture work without direction." Dr. Payne, however, does not content himself with preaching. He enriches his reader from the fund of knowledge which he has gained through years of practical experience.

Few dentists in general practice will disagree with Clyde Schuyler's observation that "a better understanding of occlusion is imperative if a better oral health service is to be rendered. It is the key to better dentistry. . . . One of the next, great forward steps in the practice of dentistry as a health service will result from the dentist's improved concept of occlusion and a realization of his responsibility in perfecting and maintaining it."

Walter Hall, writing on occlusion in partial dentures, confirms Dr. Schuyler's opinion. Not only is it important, he says, to prepare the dental arch properly to receive the appliance, it is equally important to establish functional occlusion and registration. To William Dykins, also writing on the subject of partial dentures, dentistry is largely a study in biomechanics. There are three ways, he says, in which cells are destroyed: by interfering with the metabolistic process; by infection, and by trauma. Since trauma plays a major role in many dental problems, its elimination should be the first concern of every practicing dentist. Arthur Schopper solves a major portion of the problems arising from trauma by the use of precision attachments. His clear-cut well-illustrated article on the construction of precision attachment partial dentures supplemented with stress-breakers is "must" reading for the dentist who is interested in improving his service.

O. M. Dresen's discussion of interocclusal records, Raymond Nagle's paper on postinsertion problems and Arthur Frechette's article on the problems associated with abnormal jaw relations are filled with practical suggestions no general practitioner of dentistry dare miss. Of equal value, but perhaps with their interest limited more directly to the rehabilitation specialist and the researcher, are Rosen and Bzock's article on prosthetic speech appliances and Szmyd, McCall and Allen's paper on a method for measuring topographic changes of the maxillary residual ridge mucosa.

THE JOURNAL takes this opportunity to thank the authors of these twelve special prosthodontic articles for their valuable contributions to its pages. And it is hoped that readers who share THE JOURNAL's judgment in this instance will not hestitate to so advise the authors.

Washington columnist once again in error

Once again the Washington columnist, Mr. Pearson—first name Drew—draws attention to his column through muckraking means. In his July 1 article, published in the *Washington Post and Times Herald* and in other of the nation's papers, Mr. Pearson erroneously reports that the American Dental Association has asked dentists in the Washington, D.C., area to give free treatment, if possible, to congressmen and their families in order to create good will. (See news story on page 262 of this issue.)

Such a flagrant and deliberate departure from the truth cannot go unchallenged. In an effort to undo the damage done by Mr. Pearson, Harold Hillenbrand, secretary of the American Dental Association, sent the columnist the following telegram:

"The statement in your column of July 1 that 'the American Dental Association has asked dentists in the Washington area to give free treatment, if possible, to Congressmen and their families in order to create good will' is not true.

"The Association has not attempted to influence any member of Congress or other individual by offers of free health care. Your statement to the contrary is an unwarranted attack upon the professional organization of the great majority of the nation's dentists.

"The Association expects from you a retraction of this statement in your column."

It is inconceivable that the frequent damaging errors found in Mr. Pearson's column are the result of carelessness. More likely they are an indication of the bad little boy complex which prompts the transgressor to stick out his tongue or write dirty words on the wall to attract attention. In the end the bad little boy suffers the most—in the end.

Maligning is bad—for the public that reads it, for the paper that prints it, and, in the end, for the reporter that writes it.

Lo, the lowly toothbrush: most neglected health accessory

Charles Johnson Post, whose Spanish-American War paintings have won him fame both as an artist and as a historian, records, in one of his on-the-spot sketches, the minor but meaningful role played by the government issue toothbrush in the liberation of Cuba.[1] On a hot midsummer day in 1898 the Seventy-first New York Volunteer Infantry marched into Santiago wearing the Cuban campaign badge—a toothbrush stuck in a hatband.

History does not record whether the immaculate members of the Seventy-first brushed their teeth before or after their breakfast of hardtack and bully beef. Probably at the time it did not matter as probably the Volunteers were more concerned with matters of more importance. In that respect the Spanish American warriors were no better or no worse than millions of their predecessors and other millions who have succeeded them.

Despite the wealth of mouth hygiene information annually released in schools, in the press and over the air, the habit of cleaning the teeth has not become as firmly fixed as have some other hygienic habits—such as brushing the hair or washing the face and hands. All too frequently in the rush of the day's duties dental toilet receives but scant attention. Not only is dental hygiene neglected but so, too, are its accessories.

Probably no other article in the crowded cosmetic field is so highly proclaimed in public and so highly disregarded in private as the toothbrush. During the year 1957 seven major toothbrush manufacturers[2] spent for magazine, newspaper and television advertising more than $1,390,000. Their ads not only extolled the virtues of particular brushes, they explained their use and praised the benefits of brushing. Such advertising, supplementing the educational efforts of the profession, has been going on for years. Yet, according to a recent one thousand family toothbrush study[3] two out of every three working toothbrushes in the United States are not fit for use. Of 2,032 brushes examined, 1,219 were in unusable condition and 90 were in such

condition that their usefulness was considered doubtful. Only 700 were approved. Ten years ago the Council on Dental Health of the Association conducted a similar study[4] the findings of which were even less flattering. According to that study four-fifths of the toothbrushes in use in American homes were unserviceable.

Gruebbel and Wisan who conducted the 1948 study concluded that "only a small percentage of the American public follow the oral hygiene practices which the dental profession believes are important in maintaining dental health." Those who participated in the more recent study concur and add "the toothbrush too often is regarded as an incidental possession—so much so that people are careless about replacing it when it wears out . . . proper use of a good toothbrush is vital to dental hygiene. Indifference is costly."

Although great improvement has occurred in America's mouth hygiene habits since the Seventy-first Volunteers marched into Santiago with toothbrushes in their hats, greater improvements are necessary if dental disorders are to be placed under control. The weaknesses disclosed by the two surveys herewith cited should stimulate the profession to increase its efforts and go to greater lengths to make good mouth hygiene practices basic in every American home.

1. Life 45:52 July 7, 1958.
2. Drug Trade News July 14, 1958.
3. You and your toothbrush. DuPont Magazine June-July 1958, p. 5.
4. Gruebbel, Allen O., and Wisan, J. M. A study in toothbrushes in use in American homes. J.A.D.A. 37:346 Sept. 1948.

International Correspondence

NEWS FROM GREAT BRITAIN

At the last meeting of the Representative Board of the British Dental Association the members discussed the finances of the Association and decided to recommend to an Extraordinary General Meeting of members in October that the annual subscription should be increased.

The Honorary Treasurer pointed out, during the debate on accounts, that the income of the Association was not sufficient for its purposes. He said that, as in all other organizations, costs over which the Association had no control had increased and salaries had to be raised. In addition to the extra day-to-day expenditure, the Association would very soon either have to buy premises or pay a much increased rent. The present income of the Association would not allow for either.

The financial position of the Association must, therefore, be improved for two purposes: to establish a fund for the provision of permanent headquarters of a style proper to the standing of dentistry, and to provide an income which will release the Finance Committee from continual pecuniary embarrassment. Not only is this necessary to the continued success of the profession, it has become a matter of great urgency. In the interests of the future of dentistry it is necessary to raise the subscription to the Association. The Board gave a long time to the matter and, after a detailed discussion of the report of the Finance Committee, decided to recommend to the membership that the subscription be raised to nine guineas.

Royal Commission on Doctors' and Dentists' Remuneration • In April last, senior officials of the Ministry of Health, the Department of Health for Scotland, and the Treasury gave verbal evidence before the Royal Commission on Doctors' and Dentists' Remuneration.

The Commission sought the views of the Department officials as to the reasons for the apparent lack of confidence amongst the medical and dental professions in the government as paymaster and employer. The relativity of medical and dental remuneration was discussed. The comment was that the 1,600 pounds in the case of a fully efficient dentist working for a specified number of hours with appropriate chairside assistance was comparable with 1,800 pounds in the case of a general medical practitioner working in the same way. Emphasis is laid on the last five words because they underline the point made by the Association's witnesses when they appeared before the Commission. It was brought out in subsequent questioning that there could be no direct comparison when, on the one hand there was the dental scale designed to produce basic remuneration (Spens recommendation No. 2), and on the other hand, arrangements for medical payment designed to produce average remuneration.

Further points discussed were the cost of living index, the consultants' case, additional accommodation in dental schools, alternative methods of remuneration, and lack of consultation with the profession.

The Minutes of Evidence given by the British Dental Association to the Royal Commission, incorporating the original Memorandum as well as verbal evidence, will be on sale at H.M. Stationery Offices, or through booksellers, from Monday, June 2, 1958, priced at five shillings, sixpence.

Dental Technicians • The following recommendation was adopted: "That the Representative Board approve the establishment and maintenance by the National Joint Council of the Craft of Dental Technicians of a voluntary register of dental technicians and apprentices in accordance with the draft regulations prepared by the Joint Council now submitted."

BRITISH DENTAL JOURNAL

An interesting original report is published in the June 3rd issue of the *Journal* entitled "A Clinical Investigation into the Variability of Dental Caries Diagnosis" by Drs. Slack, Jackson, James and Lawton.

THE CASE OF THE BUS DRIVER

A good deal of unjust criticism has been leveled at the London dentist who, having a full appointment book for two or three weeks ahead, refused a new patient an early appointment for routine dental treatment, and on being told that he was a bus driver on strike told him to come back when the strike was over. It seems fair to comment also on the actions of two other parties who became involved in this matter.

It is surely a sign of the strange times in which we live that a bus driver who, by striking, is causing much hardship to many people, and especially to the aged and the sick, should feel impelled to invoke the aid of a Member of Parliament when he, himself, is inconvenienced.

Even stranger, and more open to criticism, is the action of Mr. W. T. Proctor, the Member of Parliament for a constituency nearly 200 miles away, who threatened the dentist that he would report him to the Ministry of Health for disciplinary action if the bus driver were not given an early appointment. This threat was, of course, groundless, as the Minister made clear in the Parliamentary answer of May 15. It was established that a dentist who is taking part in the National Health Service is free to accept or refuse any patient, who can then seek treatment from any other dentist taking part.

An editorial in the *British Dental Journal* comments as follows:

"But should the threat ever have been made? Is it a proper part of the functions of a Member of Parliament to make a personal approach to a citizen (outside or inside his constituency) and use threats, however hollow they may be, in an attempt to coerce that citizen into doing something that the law says he is not compelled to do?

"Does Mr. Proctor really feel that the London public is not being inconvenienced sufficiently by the bus strike, but that in addition it is the duty of dentists to inconvenience the public still further by cancelling appointments of several weeks standing in order to give routine treatment to bus-drivers who find themselves with time on their hands?"

SCHOOL DENTAL SERVICE

The City of Birmingham has an estimated population of 1,110,800 and the density of population is 2,172 persons per acre. There are 479 schools, including nursery schools, and the average number of children on the rolls is 185,271. Special schools number 26 with an average number of 3,168 children. Dr. H. M. Cohen, principal school medical officer, draws attention to the excellent work of the School Dental Service led by D. G. Thomson, principal school dental officer. Plans are afoot to increase the number of clinics and set up a laboratory.

Formidable Total of Casuals • Of the 119,990 children inspected in school, 78,417 were found to require treatment, 64,884 were referred and 22,874 had not only received treatment but attended the clinics on 11,125 further occasions to have their necessary treatment completed. Graphically, these casual cases show a precipitous rise since 1950 until 1952 when they leveled off at a figure above 20,000. There was a corresponding rise in the number of permanent teeth extracted which has now reached 23,691.

Education to Overcome Prejudice • While the volume of conservative work shows a parallel rise since 1952, Thomson points out that there is still a hard core of prejudice against fillings. Large scale propaganda has been carried out by combined dental efforts in Birmingham during the past year, and it will be interesting to see what the influence will have been on this prejudice.

The view is held that the dental education of children can best be carried out at the chairside during treatment, at routine school inspections, and to groups of children, preferably those 11 to 12 years of age. From the educational point of view, it is a grim thought that Britain's consumption of chocolates and sweets has increased again during the last year, over eight and a half ounces being eaten each week per capita.

ITEMS OF INTEREST

The Royal Society of Health, at its 65th Congress held at Eastbourne, included a dental symposium entitled "Dental Disease—The Last Great Epidemic."

Three papers had been circulated and were taken as read, the authors speaking briefly. The papers were "The Nature of Dental Disease" by G. L. Slack; "The Responsibility for Dental Care" by P. G. Capon, and "Promoting Dental Health Through Education" by W. Stewart Ross.

A recent revision of the rules of the Irish Dental Association, so as to provide for associate membership in the Association, would be of considerable interest to Irish dentists in practice in Britain. Under the revised arrangements, a member of the dental profession who is on a dentist's register and not practicing in the Republic of Ireland may become an associate member on payment of an annual subscription of 2 pounds 10 shillings.

At the special invitation of the junior staff of the London Hospital Dental School, Professor Peter Adler of Debrecen, Hungary, recently paid a short visit to London. To an audience composed of the staff of the London Hospital Dental School and guests from other dental schools he gave extremely interesting accounts of his research work concerning the

chronology of tooth development and the physiology of local anesthetic drugs used in dental practice. He also gave a vivid and detailed account of dental education in Hungary.

Our congratulations to Professor Frank Wilkinson who has been admitted as a Fellow of the Royal College of Surgeons by election in recognition of his long service in the cause of dental education and as a former Dean of the Faculty of Dental Surgery of the College.

G. H. Leatherman,
D.M.D., F.D.S., R.C.S., F.A.C.D.

NEWS FROM AUSTRALIA

After an association of more than 40 years with the Faculty of Dental Science of the University of Melbourne, Professor C. H. Down has retired.

Long a leading professor in the field of conservative dentistry, he was graduated from the University of Melbourne in 1912 and obtained his doctorate of Dental Science in 1940. He was later elected a Fellow of the Faculty of Dental Surgery of the Royal College of Surgeons, England, and of the American College of Dentists.

WINTER CONVENTION AT MELBOURNE

Lectures, table clinics and special classes in practical dental radiography technics, pedodontics and preventive dentistry were features of the Winter Convention held June 2-7 by the postgraduate committee of the Victorian Branch of the Australian Dental Association. Lecturers were Professor Sir Arthur Amies, Professor Frank Shaw, Associate Professor Noel D. Martin, Kenneth Adamson, W. E. Fleming, R. N. Peverill, W. P. Riordan and J. Dawkins.

NEW SOUTH WALES

A Country Convention will be held at Newcastle Sept. 22-26 with an extensive program of lectures and table demonstrations. In addition to the lectures and the trade exhibit to be held at the Royal Newcastle Hospital, chairside clinics will be conducted in operative dentistry, crown and bridgework, periodontics and orthodontics.

QUEENSLAND

A course consisting of 18 lectures on practice administration has just been completed at the Brisbane Dental College. Conducted by the Queensland Branch of the Association, it was judged highly worthwhile by those attending.

At the 10th annual Dental Assembly held in Bundaberg, Dr. A. W. Bull of Sydney was guest clinician. He presented clinics on practical procedures; trends in operative dentistry and their application, and an evaluation of the dental pulp.

The personnel at the Cairns Convention, at present under way, includes in addition to those from Brisbane and two members of the medical profession, clinicians from Melbourne, Sydney and Adelaide.

ARMY TRAINING FOR DENTAL GRADUATES

One of the problems facing the dental profession is the provision of sufficient trained personnel to establish a dental service for the expansion of the armed forces. With this in mind recent graduates have been invited to join a new type of army dental unit. Graduates will be given the provisional rank of Captain. When this rank has been confirmed they will be given an opportunity to serve in a dental unit in the C.M.F. for a period, or, if they prefer, will be posted to the Reserve.

CHAIRSIDE STATUS FOR MECHANICS

In accordance with the Tasmanian Dentists' Act of 1957 a Dental Mechanics Board has been set up in Tasmania and has recently conducted its first examinations for the registration of mechanics with the right of direct contractual relationship with the public.

Of the 41 candidates who presented for examination, 28 passed the necessary requirements for registration and will be permitted to deal directly with the public.

The dental profession in this country strongly opposed the legislation and is most apprehensive as to the future of dentistry in Tasmania. Dental mechanics have neither the skill nor the basic training to enable them to provide a satisfactory service, and in this newly created sphere can only be regarded as a menace to public health.

Margaret Hjorth

"RECKLESS" DENTIFRICE ADVERTISING SCORED AT CONGRESS SUBCOMMITTEE HEARINGS BY MEMBERS OF THE ASSOCIATION

The American Dental Association has formally urged Congress to enact and enforce controls over what it calls "reckless" advertising claims by the nation's dentifrice manufacturers.

Testifying in Washington July 17 before a House legal and monetary affairs subcommittee headed by Rep. Blatnik (D., Minn.) Ralph E. Creig of Cleveland, a member of the Council on Legislation, summarized the Association's position:

"We believe strongly that existing law and enforcement procedures need strengthening, at least insofar as therapeutic claims for dentifrices and drug products are concerned."

Others appearing before the subcommittee, a component of the House Committee on Government Operations, were Harry Lyons of Richmond, dean of the School of Dentistry of the Medical College of Virginia, and immediate past president of the Association, and Sholom Pearlman, assistant secretary of the Council on Dental Therapeutics.

Dr. Lyons, after a general deflation of advertising boasts that have appeared within modern times, grew particularly critical of one claim—that which deals with "once-a-day" brushing:

> Some of this advertising goes so far as to claim that "sweets" may be eaten with impunity through the day, provided only that the toothpaste in question has been used just once in the morning before breakfast.
>
> This vicious suggestion flies in the face of all that has been done by the health professions to educate the public about hygienic and dietary measures for protecting the teeth against the ravages of decay.
>
> There are no short-cuts to dental health and to mislead the public in this regard is to work deliberately against the public welfare.

Dr. Pearlman, in a specific review of the claims made for leading dentifrices, said the Association based its opinion on the actual performance of dentifrices in reducing or preventing tooth decay in human beings and not on theoretical experiments.

"The brushing is what counts," Dr. Pearlman said as he described dentifrices as "only an aid to the toothbrush."

Dr. Pearlman further stated that the American Dental Association was unaware of any adequate scientific evidence to support "therapeutic" claims in the advertising of the following brands: Super Amm-i-dent with Fluoride (Block Drug Co.); Crest Toothpaste with Fluoristan and Gleem Toothpaste with GL-70 (Procter & Gamble Co.); Ipana with WD-9 (Bristol-Myers Co.); Brisk Fluoride Toothpaste and Colgate Dental Cream with Gardol (Colgate-Palmolive Co.), and Stripe Toothpaste with Hexachlorophene (Lever Brothers Co.).

Dr. Pearlman commended "Co-op Tooth Paste" for carrying on its label the statement ". . . thorough brushing cleans the teeth—often no dentifrice at all is required . . ." This he described as a "rare example of forthright honesty."

Dr. Creig said that the Federal Trade Commission has admitted that it is powerless to halt unsupported advertising claims for dentifrices.

> Where the health of the public is involved, as it is here, the government is completely justified in requiring a high standard of responsibility from industry. At the present that standard is lacking.
>
> The burden of demonstrating the validity of therapeutic claims in advertising belongs morally, ethically and logically with the party asserting them. The current concept that such

claims must be considered to be true and unchallengeable until disproved by the public is fallacious and demonstrably ineffective.

Additional statements were prepared by Dr. Walter C. Hess of Washington, D. C., assistant dean and professor of biological chemistry, Georgetown University Schools of Medicine and Dentistry, and Dr. Donald A. Wallace of Chicago, professor of applied materia medica and therapeutics, University of Illinois College of Dentistry.

Dr. Hess reported that independent testing of Colgate's "Gardol" toothpaste had revealed that it had no more effect on acid formation in the mouth than did toothpastes not containing "Gardol."

"It is apparent that the advertising claims for protection against acid formation by 'Gardol' are not supported by published data," Dr. Hess said.

Dr. Wallace said that scientific data do not justify broad claims that dentifrices are able to prevent or eliminate "bad breath."

LABORATORY INDUSTRY SURVEY UNDER WAY THIS MONTH

The final form of the questionnaire to be used in the Dental Laboratory Industry Survey is being developed by the Council on Dental Trade and Laboratory Relations and the Bureau of Economic Research and Statistics of the American Dental Association. The survey was authorized by a 1957 resolution of the House of Delegates.

A preliminary test questionnaire was sent to about 20 laboratories, large and small, in widely scattered sections of the country. The response was enthusiastic; some replies containing suggestions ran to five and six pages. Many of these suggestions for changes will be incorporated into the final form which will be mailed to more than 6,700 dental laboratories in the United States.

The National Association of Dental Laboratories, which is assisting in the preparation of the questionnaire, will send a request to all dental laboratory owners to cooperate in the survey project.

Dentists are asked to advise the dental laboratories with which they do business that the questionnaires will be mailed toward the end of this month.

49TH STATE REPEATS; RELIEF FUND DRIVE OVER THE TOP

The newest state in the union, Alaska, again far exceeded its quota in contributions to the 1957-58 Relief Fund campaign which ended June 30.

With its customary fervor Tennessee more than trebled its quota; Alaska placed second, and Southern California was third in percentage contributions.

New York State, with over 13 thousand, Southern California, with over ten thousand, and Illinois, with over eight thousand, were the leading contributing societies dollarwise.

For the sixth straight year contributions exceeded the goal set, the Council on Relief announcing a total of $121,929.28. States with quotas of less than $1,000 contributed 140 per cent. States with quotas of more than $1,000 gave 119.5 per cent. The Federal Dental Service's portion was 84.2 per cent of its quota.

The listing of amounts by constituent societies and other groups is as follows:

	Quota	Total Contribution
Alabama	$ 850.00	$ 1,547.00
Alaska	60.00	150.00
Arizona	360.00	706.00
Arkansas	530.00	691.65
California	4,010.00	4,723.50
So. California	4,900.00	10,354.01
Colorado	1,010.00	1,245.00
Connecticut	1,950.00	2,138.00
Delaware	150.00	275.00
Dist. of Columbia	740.00	1,452.00
Florida	1,530.00	1,917.00
Georgia	1,080.00	1,225.50
Hawaii	390.00	697.00
Idaho	280.00	307.00

Illinois	6,830.00	8,296.40
Indiana	2,230.00	2,655.00
Iowa	1,740.00	1,757.50
Kansas	970.00	1,090.50
Kentucky	1,170.00	1,955.26
Louisiana	1,050.00	1,089.00
Maine	440.00	777.00
Maryland	1,160.00	1,514.50
Massachusetts	3,580.00	3,602.34
Michigan	4,240.00	4,852.00
Minnesota	2,650.00	3,330.50
Mississippi	550.00	411.00
Missouri	2,350.00	2,572.00
Montana	370.00	527.00
Nebraska	960.00	1,146.00
Nevada	120.00	178.00
New Hampshire	310.00	260.00
New Jersey	4,020.00	5,501.50
New Mexico	260.00	419.50
New York	14,600.00	13,583.60
North Carolina	1,310.00	1,885.00
North Dakota	290.00	512.00
Ohio	4,920.00	4,724.63
Oklahoma	910.00	1,001.00
Oregon	1,320.00	1,497.00
Panama C. Z.	20.00	20.00
Pennsylvania	6,660.00	6,433.50
Puerto Rico	250.00	219.00
Rhode Island	540.00	919.00
South Carolina	440.00	411.00
South Dakota	300.00	498.00
Tennessee	1,380.00	4,670.00
Texas	3,280.00	3,665.00
Utah	510.00	690.00
Vermont	170.00	326.00
Virginia	1,280.00	1,390.00
Washington	1,920.00	2,389.50
West Virginia	700.00	875.00
Wisconsin	2,880.00	2,675.50
Wyoming	160.00	199.00
Federal Dental Services		
Air Force	630.00	533.83
Army	590.00	521.50
Navy	1,070.00	896.50
Public Health Serv.	240.00	439.50
Vet. Administration	790.00	404.50
Others		
Students	.....	954.00
Memorials	.....	20.00
Miscellaneous	.....	212.06
Total	$100,000.00	$121,929.28

SENATE-HOUSE CONFEREES VOTE FUNDS FOR HEALTH

Senate-House conferees agreed July 17 on a budget for the Department of Health, Education, and Welfare including record high appropriations for the Institutes of Health. Approval by the Senate and the House was expected momentarily as THE JOURNAL went to press.

A total of 294 million dollars was proposed, of which about seven and a half was earmarked for dental research. The total figure was 75 per cent more than the House had proposed.

PROTEST TO DREW PEARSON BRINGS LITTLE RESPONSE

As the Journal goes to press no retraction has appeared in Drew Pearson's syndicated newspaper column in answer to the protest sent him by the American Dental Association.

In his column of July 1, which appeared in many newspapers in the country, Pearson said:

"The American Dental Association has asked dentists in the Washington area to give free treatment, if possible, to Congressmen and their families in order to create good will."

Harold Hillenbrand, secretary of the Association, sent the following wire to the columnist:

"The statement in your column of July 1 (that "the American Dental Association etc.) is not true.

"The Association has not attempted to influence any member of Congress or other individual by offers of free health care. Your statement to the contrary is an unwarranted attack upon the professional organization of the great majority of the nation's dentists.

"The Association expects from you a retraction of this statement in your column."

Pearson replied to Dr. Hillenbrand, saying:

". . . First let me say that there was no implication in this item that dentists were trying to influence Members of Congress, nor was there any attack whatsoever on the nation's dentists, implied or

Gerard J. Casey, secretary of the Council on Hospital Dental Service, presided at one of the sessions of the Institute on Hospital Dentistry held in June at the Edgewater Beach Hotel, Chicago. The American Dental Association cooperated with the American Hospital Association to conduct the affair which was co-sponsored by the American Medical Association. Rudolph H. Friedrich, secretary of the Council on Dental Health, was a member of a panel discussing the effects of third party payment on hospital dental service. Other topics of discussion included organization of the hospital dental service, staffing problems, and needs and function of such a service. A visit to the Zoller Clinic at the University of Chicago was also on the agenda.

otherwise, in this statement.

"My grandfather was a dentist, my uncle was a dentist, and I have been very proud of their profession.

"The information contained in the statement referred to came from one of your dentists in Washington, D. C., who spoke with authority, and I have no reason to disbelieve what he said."

APPOINTMENTS, ELECTIONS OF INTEREST TO THE PROFESSION

John W. Stanford, a Fellow of the American Dental Association Research Division at the National Bureau of Standards, has been elected secretary-treasurer of the Washington section of the International Association for Dental Research.

Donald A. Washburn, director of the American Dental Association Bureau of Library and Indexing Service, was named to a one year term as a director of the Medical Library Association at the recent annual session of the organization in Rochester, Minn. Dr. Washburn was formerly business manager of the *Bulletin of the Medical Library Association* and is chairman of the group's subcommittee on curriculum. The Medical Library Association is an international organization of 1,300 members who are librarians or institute members in the medical, dental, pharmacy, nursing and hospital fields.

Lon W. Morrey, editor of the American Dental Association, has been reelected to the board of directors of the Tuberculosis Institute of Chicago and Cook County, and Edgar Swanson, professor of operative dentistry and secretary of the faculty of Northwestern University School of Dentistry, has been named vice-president of the same organization.

William R. Alstadt, president of the American Dental Association, has announced the appointment of Howard F. Lyboldt, Rochester, N. Y., as a member of the Council on Dental Health to fill the vacancy created by the death of Donald H. Miller, Elmira, N.Y.

President Eisenhower has appointed Fritz A. Pierson of Lincoln, Neb., a trustee of the American Dental Association and past president of the American College of Dentists, as an additional dental member of the President's Citizen's Advisory Committee on the Fitness of American Youth. C. Willard Camalier, past president and assistant secretary of the American Dental Association, was also named for another term to this committee by the President.

BUREAU ISSUES PACKET OF POSTERS FOR SCHOOL USE

A set of four posters for use in elementary school classes has been issued by the Bureau of Dental Health Education.

The posters have no legends for the illustrations and are designed to stimulate discussion. They were found to be effective in stimulating discussion on dental and general health in tests conducted by elementary school teachers. The importance of dental care, proper brushing, brushing after eating and good nutrition is emphasized.

The sets are priced at 60 cents for one set, $9 for 25 sets, $17 for 50 sets and $30 for 100 sets. They may be purchased through the Order Department of the Association, 222 E. Superior St., Chicago 11.

AMENDED KEOGH RETIREMENT BILL OUT OF COMMITTEE

A modified version of the Jenkins-Keogh retirement bill has been approved by the Ways and Means Committee of the House of Representatives and action by the House was expected before the end of July. The bill, as amended by the committee, would place a limit of $2,500 on the amount that could be put aside annually and a limit of $50,000 on a 20-year basis.

X-RADIATION TO BE ONE OF PANEL DISCUSSIONS AT DALLAS

Misleading articles in the popular press have brought the word "radiation" into fearful focus where the general public is concerned.

Thus the profession must be fully equipped to allay the layman's fear of the word as it is applied to the practice of dentistry.

To acquaint members of the Association, then, with the latest information on this subject, a panel discussion on x-radiation in dentistry will be among the program features during the 99th annual session of the American Dental Association at Dallas.

Arthur H. Wuehrmann, chairman of the Section on Roentgenology, will preside at the morning panel discussion on Thursday, November 13. Moderator will be George C. Paffenbarger, Senior Research Associate, American Dental Association Research Division, National Bureau of Standards, Washington, D. C. He will also talk on Federal specifications for films and equipment.

Dental x-ray equipment and x-radiation will be discussed by E. Dale Trout, D. Sc., of the x-ray department of General Electric Co., Milwaukee, and A. Porter S. Sweet of the Eastman Kodak Co., Rochester, N. Y., will speak on dental x-ray films and x-radiation.

A two-part forum on conservation of

MEETINGS IN DALLAS

American Academy of Gold Foil Operators	November 7, 8	Adolphus (meals) Baylor University (meetings)
American Academy of the History of Dentistry	November 7	Baker
American Academy of Implant Dentures	November 7-9	White Plaza
American Academy of Oral Roentgenology	November 7, 8	White Plaza
American Academy of Periodontology	November 6-8	Baker
American Association of Dental Editors	November 9	Statler Hilton
American Association of Dental Examiners	November 7, 8	Statler Hilton
American Association of Dental Schools	November 9	Statler Hilton
American Association of Public Health Dentists	November 8	Dallas hotel
American College of Dentists	November 9	Baker
American Dental Assistants Association	November 10-13	Baker
American Dental Hygienists' Association	November 10-13	Adolphus
American Dental Society of Anesthesiology	November 8, 9	Medical Arts Building (meetings)
	November 8	Statler Hilton (luncheon and cocktail party)
American Denture Society	November 7, 8	Adolphus
American Society of Dentistry for Children	November 7-9	Adolphus
Association of American Women Dentists	November 10-13	Baker
International College of Dentists	November 9	Adolphus
National Association of Dental Auxiliaries	November 10-13	Adolphus
National Association of Seventh Day Adventist Dentists	November 7-9	Dallas hotel
Baylor University Dental Alumni Association	November 10	Adolphus (luncheon)
Loyola University (Chicago) Dental Alumni Association	November 11	Baker (luncheon)
Marquette University Dental Alumni Association	November 11	Adolphus (luncheon)
Northwestern University Dental Alumni Association	November 12	Baker (luncheon)
University of Maryland Dental Alumni Association	November 11	Statler Hilton (breakfast and cocktail party)
American Dental Interfraternity Council	November 9	Statler Hilton
Alpha Omega	November 10	Adolphus (banquet)
Delta Sigma Delta	November 7-10	Adolphus
Psi Omega	November 10	Statler Hilton
Xi Psi Phi	November 10	Baker (banquet)

the dental pulp will be held on Tuesday, November 11, under the chairmanship of David B. Scott of the Section on Research. Helmut A. Zander, Eastman Dental Dispensary, Rochester, N. Y., will preside.

At the first session Verda E. James of Chicago, Paul E. Boyle, School of Dentistry, Western Reserve University, Cleveland, and Vincent F. Lisanti, School of Dental Medicine, Tufts University, Boston, will participate.

Speakers at the second session will be Dr. Zander, Samuel Seltzer of Philadelphia and Sumter Arnim of the School of Dentistry, University of Texas.

A panel discussion on the preparation of periodontal tissues prior to restorative procedures will be held in the forenoon of Wednesday, November 12. Erwin S. Schaffer, chairman of the Section on Periodontics, will preside, and the moderator will be S. R. Parks of Dallas.

Panel participants will be C. Kenneth

Collings, College of Dentistry, Baylor University, Dallas, Claude L. Nabers of San Antonio, and William C. McCaskill, Jr., Dallas.

BOOKLETS OF INFORMATION READY FOR GRADUATES, OTHERS

The sixth annual editions of two publications of importance to the graduating dental student and the dentist who wishes to relocate have been published.

B. Duane Moen, director of the American Dental Association's Bureau of Economic Research and Statistics, reports that copies of booklets will be sent in the fall to all junior and senior student members of the Association. However, single copies are available to any dentist at any time on request.

Distribution of Dentists in the United States by State, Region, District and County contains facts and figures on the total number of dentists in 1957, population per dentist, the number of 1957 graduates, estimated population, per capita buying income and per capita retail sales.

Facts about States for the Dentist Seeking a Location is a collection of statistical tables and also includes sources of further information about states.

Copies of the brochures are available from the Bureau.

FELDMANN NAMED DIRECTOR OF THERAPEUTICS UNIT

Formal establishment of the Division of Chemistry as a unit of the Council on Dental Therapeutics has been made, Harold Hillenbrand, secretary of the American Dental Association, said.

Director of the Division will be Edward Feldmann, Ph.D., who has been serving as senior chemist with the Council for about three years.

Feldmann, who received his B.S. degree in chemistry from Loyola University, received his Ph.D. degree in pharmaceutical chemistry and biochemistry from the University of Wisconsin. While there he held a Fellowship sponsored by the American Foundation for Pharmaceutical Education.

The function of the Division of Chemistry is to develop new methods for analyzing drugs to ascertain their composition, stability and the other characteristics which may be important in determining the usefulness of the products to the dentist.

COPIES READY OF J.A.D.A. AND DENTAL LITERATURE INDEXES

The semiannual index of the *Journal of the American Dental Association,* covering the period of January-June 1958, is now available from the Central Office. Copies may be had on request from the subscription department.

Also available this month will be the second quarterly issue of the *Index to Dental Literature,* covering the same period. Published cumulatively four times a year, the *Index* may be subscribed to at the rate of $20 a year.

SYMPOSIUM ON LICENSURE AND RELATED SUBJECTS SET

The Council on Dental Trade and Laboratory Relations will present a symposium on licensure and registration of commercial dental laboratories and dental laboratory technicians September 29 and 30 at the American Dental Association's Central Office.

According to Walter E. Dundon, chairman, the council believes that every constituent dental society and state examining board will wish to be represented at the symposium. The papers to be presented and discussed will provide useful information on the history and philosophy of occupational licensing in the United States, the policy of the Associa-

tion on licensure and registration of dental laboratories and dental laboratory technicians, the Florida Dental Laboratory Registration Law, the legislative activities of the "public denturist" group, the accreditation of dental laboratories, the education and certification of dental laboratory technicians, and a number of other topics.

NEW BOOKLET DESCRIBES VALUE OF X-RAY EXAMINATION

A new booklet prepared by the Bureau of Dental Health Education, American Dental Association, details the value to patients of periodic roentgenographic examination and clarifies confusion surrounding the possibility of harmful amounts of radiation affecting the reproductive cells during dental roentgenographic examination.

Sample copies may be obtained from the Bureau of Dental Health Education. In quantities, 100 leaflets are $1; 500 are $4, and 1,000 are $7, and are available from the Order Department at the Central Office.

Dental Societies

HAWAIIAN DENTAL SOCIETY REAFFIRMS FLUORIDATION

At the 56th annual meeting of the Hawaii Territorial Dental Society in June the House of Delegates of the Society reaffirmed its previous endorsement of fluoridation of the public water supplies of the Territory.

Delegates cited the approval of such a course by the major organizations of the United States that are concerned with the health and welfare of the people, and the recommendation of the American Dental Association and the American Medical Association.

Almost 60,000 Navy and Air Force personnel, dependents and civilian employees at Pearl Harbor are now drinking fluoridated water. Action to start the fluoridation project in the Pearl Harbor area was initiated by the then District Dental Officer, Rear Admiral C. C. DeFord, DC, USN, as soon as the Defense Department endorsed fluoridation of water supplies as a public health measure at bases with dependent children in residence.

William C. Pruden Jr. (center) holds "Plaster Bowl," symbolic of having been medalist in the golf tournament held in conjunction with the spring meeting of the Greater New York Academy of Prosthodontics. Others pictured are Campbell Hudson (right), donor of the bowl, and Carlisle C. Bastian.

The Delaware State Dental Society annual meeting in June was the first formal two day meeting in the society's history. Pictured at one point in the proceedings were (left to right) James C. Baker, Clyde Nelson, William Alstadt, president of the American Dental Association, Paul K. Musselman and Joseph S. Mach.

Myron Aisenberg, dean of the Baltimore College of Dental Surgery, second from right, is congratulated by William R. Alstadt for having won Albert Fones Award. In the picture, taken during meeting of the Connecticut State Dental Association, are (left to right): Arthur Easton, trustee, first district, American Dental Association; Jesse Englander, past president of the Connecticut association; W. R. Alstadt, president, American Dental Association; M. Aisenberg, and William D. MacIntosh, president of the Rhode Island State Dental Society.

INDIANA ASSOCIATION GIVES CENTENNIAL AWARDS TO 14

The Indiana State Dental Association presented awards to 14 persons in connection with the observance of the Association's centennial at its annual meeting May 18-21.

Recipients included Eli Lilly, chairman of the board of the Eli Lilly Company, and Leroy E. Burney, M.D., Surgeon General of the Public Health Service.

The 12 dentists who received awards were Harold Hillenbrand, secretary of the American Dental Association, John E. Buhler, Ernest D. Cofield, I. Lester Furnas, Robert R. Gillis, Raymond L. Hayes, Milus M. House, Charles R. Jackson, Carl D. Lucas, Howard R. Raper, Gerald D. Timmons and John F. Volker.

Dental Education

ORAL SURGERY INTERNSHIP ANNOUNCED AT U. OF TENNESSEE

The University of Tennessee Memorial Research Center and Hospital Department of Dentistry announces an internship in straight oral surgery, approved by the Council on Dental Education of the American Dental Association.

Training will consist of all phases of oral surgery, major and minor, physical and oral diagnosis, radiology, oral pathology and anesthesiology. Special consideration will be given to problems in pedodontics, periodontics, and prosthetics as related to oral surgery. The interne will attend the Cleft Palate Clinic at the East Tennessee Children's Hospital as a part of his training.

The internship begins on January 1, 1959, and runs for 12 months. An honorarium of $300 per month will be paid plus customary maintenance, laundry, board and room on premises.

Applications must be received by October 15. They may be obtained from: Medical Director, University of Tennessee Memorial Research Center and Hospital, Alcoa Highway, Knoxville, Tenn.

ORAL SURGERY CERTIFICATE COURSE AT NEW YORK SCHOOL

A postgraduate certificate course in complete oral rehabilitation will be offered during the 1958-59 academic year by New York University's College of Dentistry in the new facilities of the college at 421 First Ave., New York.

The intensive 180 hour course will be presented from 1 to 7 p.m. each Friday from October 3 through May 22 by David H. Coelho and Eugene A. Rothschild.

Further information may be obtained by writing to: Director, Postgraduate Division, College of Dentistry, 209 E. 23 St., New York 10.

Galen W. Quinn, right, was honored with a farewell dinner, presentation of a plaque and a silver chafing dish set on the occasion of his departure from the University of Tennessee where he had been head of the pedodontics department of the dental school. Dr. Quinn will become associate professor of orthodontics at Duke University. Others are, from the left, Buford Wallace, J. B. Edmonds and L. C. Templeton. The testimonial affair was held at the Colonial Country Club, Memphis.

POSTGRADUATE AND REFRESHER COURSES OFFERED BY SCHOOLS

Alabama • During the month of October, the University of Alabama School of Dentistry will present the following refresher courses: Adeeb E. Thomas will conduct a course in root canal therapy on October 4, 5 and 6; A. Key Foster, Plato G. Britton and Carl P. Heartburg will combine forces to give a course in insurance, investments and estate planning October 18 and 19; Lincoln Manson-Hing will present a course in x-ray technics for dental hygienists and assistants on October 24, 25 and 26.

Further information can be obtained from the director, Refresher Course Program, University of Alabama School of Dentistry, 1919 Seventh Ave. S., Birmingham.

California • A general review course in dentistry will be offered by the dental program of the University of California Extension starting December 1 and continuing for eight and one half weeks. Enrollment is limited and closes November 14.

Further information may be had from J. Eugene Ziegler, Extension Dental Program, University of California, 815 S. Hill St., Los Angeles 14.

Illinois • The division of postgraduate education at the College of Dentistry, University of Illinois, will offer a concentrated two week course in oral and maxillofacial surgery beginning October 13.

Daniel M. Laskin, associate professor of oral surgery, will direct the course which is planned primarily for dentists in general practice but will not exclude specialists in oral surgery.

Information and applications can be obtained from the division at 808 S. Wood St., Chicago 12.

Michael Reese • The department of dentistry of Michael Reese Hospital Medical Center, Chicago, will present a two-week course in the theory and practice of periodontics September 16-27.

The faculty will include several members

of the department of periodontology of Chicago College of Dental Surgery of Loyola University.

Lectures and demonstrations will be given, with the class participating in the examination of patients, diagnosis and treatment planning.

The fee for the course is $400. Full details may be obtained from the dental department of the hospital, 29th St. and Ellis Ave., Chicago 16.

New York • Several courses have been scheduled by the department of periodontia and oral medicine of New York University College of Dentistry. One, two and four year courses are offered in comprehensive preparation in periodontics and oral medicine and a graduate course in periodontics and oral medicine, all to begin September 17. They are to be given by Sidney Sorrin and associates.

Inquiries should be addressed to New York University College of Dentistry, 209 E. 23 St., New York 10.

Ohio • Three of the 1958-59 postgraduate courses in dentistry offered at the College of Dentistry of Ohio State University will be given in October. They are in complete denture prosthodontics, general anesthesia and oral surgery.

Further information and applications may be secured from the postgraduate division, College of Dentistry, Ohio State University, Columbus 10.

Temple • A course in advanced surgical technics in periodontal therapy is being offered by the graduate and postgraduate division of Temple University School of Dentistry in April 1959. It is intended primarily for the dentist who is experienced in the basic surgical methods who wishes to extend his range of therapy to include osteoplasty, ostectomy, extension of the attached gingiva, extension of the vestibular trough and frenectomy.

Since close supervision is required, the course attendance is necessarily limited to ten. The tuition is $300. Further information may be obtained from: The Director, graduate and postgraduate division, Temple University School of Dentistry, Broad above Allegheny Ave., Philadelphia 10.

Fall courses in the same school include one on clinical endodontics October 20-25 and advanced fixed prosthesis November 6-8.

Tufts • The use of high speed instruments in operative dentistry will be covered in a two day refresher course to be given October 17 and 18 at Tufts University School of Dental Medicine, Boston.

The class, under the direction of Ronald E. R. Lovell, will be limited to 12.

Washington • An intensive two week course in the prosthetic management of the cleft palate patient will be given October 20-31 at the Washington University School of Dentistry, St. Louis, Mo., under the direction of L. Woodrow O'Brien.

Participants are encouraged to bring a patient if they so desire, but the school should be informed early if a patient is to be brought.

Enrollment is limited to five and the tuition is $500. Inquiries may be addressed to Washington University School of Dentistry, 4559 Scott Ave., St. Louis 10.

Sen. Lister Hill (D., Ala.) recently received the annual Award of Merit of Georgetown University School of Dentistry from the Very Reverend Edward B. Bunn, S.J., (left), the university president. Senator Hill (center) was honored for significant contribution to the health of the nation and to dentistry in particular. Clemens V. Rault, dean of the School of Dentistry, looks on at right.

University of Washington • The School of Dentistry of the University of Washington will offer two new courses of graduate study in periodontics and endodontics, both leading to M.S. degrees.

The courses, beginning October 1, are of 18 months' duration and are directed toward the training of teachers and research workers.

Information may be obtained from Saul Schluger, Director, graduate dental education, University of Washington School of Dentistry, Seattle 5.

Pictured here during recent Mexico City meeting at which plans were drawn for upcoming Pan American Dental Congress are, from left: J. D. Howard of Oakland, Calif., travel coordinator for the Congress; Roberto M. Ruff, president, Mexican Dental Association; Mrs. Ruff, and Robert E. Woodworth, foreign secretary for the Mexican association. More than 1,000 dentists and their wives are expected to attend the Congress, which will be held Nov. 18-23 in Mexico City, immediately following the American Dental Association's 99th annual meeting in Dallas. Inquiries regarding reservations for the Mexican meeting should be addressed to Pan American Dental Congress, Medical Arts Bldg., 1715 Pacific Ave., Dallas 1.

International

NORWEGIAN PARLIAMENT TOLD FLUORIDATION TO START SOON

At a recent meeting of the Storting, Norwegian parliament, the Minister of Public Health told members that the government is strongly in favor of fluoridation of public water supplies. He said:

"Considering the alarming increase of caries in Norwegian children, the government feels that the time has arrived to add fluoride (1 ppm) to the drinking water whenever and wherever possible. Fluoridation will soon be initiated, first in cities with waterworks providing a centralized supply.

"The government, however, does not intend to force fluoridation on people who do not want it. This will be a matter of decision of local governments."

JAPAN DENTAL ASSOCIATION SELECTS NEW OFFICERS

Named to official posts in the Japan Dental Association are the following:

President, Kazuo Sato; vice-president, Taijin Yuasa; second vice-president, Masaru Maeda; secretary, Satoshi Seki; managing director, Toshio Kashima; standing director, Tsuneo Hosaka; second standing director, Noboru Fujiki, and third standing director, Ichiro Miyashita.

DENTAL CONGRESS IN CUBA POSTPONED UNTIL 1959

The Fifth National Dental Congress of the Colegio Estomatológico Nacional de Cuba, which was scheduled for November 14-17, has been postponed until 1959.

Dates for the Congress will be set later, according to Claudio Funcia Cornell, president of the Comision Científica of the Colegio.

GERMAN SOCIETY TO HOLD MEETING IN HAMBURG

The German Society of Maxillofacial Surgery (Deutsche Gesellschaft für Kiefer- und Gesichtschirurgie) will hold its eighth annual meeting August 28-30 at the University Hospital Eppendorf in Hamburg.

Representatives of several dental societies and colleges in Germany and

other countries will take part on the program, which will feature panel discussions.

Registration is being handled by A. Rehrmann, the Society's secretary. His address is Moorenstrasse 5, Düsseldorf, Germany.

Public Health

33,516,121 ARE RECEIVING BENEFIT OF FLUORIDATION

Public Health Service figures on the status of fluoridation as of June 1, 1958, show that approximately 33,516,121 persons in 1,651 communities served by 888 water supply systems are receiving the benefit of fluoridated water.

The summary figures were released by Norman F. Gerrie, chief of the division of dental public health of the Public Health Service.

At the end of 1957, 33,294,899 persons in 1,631 communities served by 870 water supply systems were receiving fluoridated water.

AUXILIARY DENTAL PERSONNEL SUBJECT OF WHO MEETING

Dental service rendered not by single dentists but by whole teams of dental personnel has been recommended by a group of experts of the World Health Organization who met last month in Geneva, Switzerland.

Shailer Peterson, secretary of the American Dental Association Council on Dental Education, was the United States member attending the first meeting of the WHO Expert Committee on Auxiliary Dental Personnel which was formed to devise means of relieving the universal shortage of manpower to fight dental diseases, the most common of all ailments.

Peterson was elected *rapporteur* for the committee, J. Llewellyn Saunders of New Zealand was elected chairman and A. I. Doinikov of the USSR was elected vice-chairman. Great Britain, Malaya, Ireland, Sweden and Brazil were also represented by membership on the committee.

The committee recommended the use of the term, "dental health team," Peterson said, and it agreed that such teams could be introduced with advantage in the established dental program of economically advanced countries as well as in building up services in areas where little or no dental care is as yet available.

In all countries the population is growing faster than the number of dentists. The most practical and the most efficient method of dealing with the situation is to train more auxiliary dental personnel to enable the dentists to render a greater amount of service to a greater number of people.

Since many nations and sections of the world have no provisions for meeting dental needs on even an emergency or pain-relieving basis, a program was unanimously endorsed by the Expert Committee which will provide for the relief of pain and the removal of infection by the extraction of affected teeth and, with later development, by the inclusion of simple restorative procedures for those areas in which no professional dental service is available. The committee recommended personnel that had been trained for periods ranging from six months to three years depending on their function.

In areas where dentistry has advanced, the committee envisaged chairside assistants, dental technicians, dental hygienists and school dental nurses who must work under the direction and supervision of fully qualified dentists who assume responsibility for their work. In this connection it was recommended to the dental profession that attention should be given to the education of dentists in utilizing the services of assistant personnel.

The functions and training of the var-

ious types of auxiliary personnel were delineated, Peterson reported, and for those countries where there is little or no dental health care available, two basic types of personnel were described, namely the "dental licentiate" and the "dental aide."

The committee's report emphasized the importance of conducting research in the field of preventive dentistry so that improved and additional methods may be found for reducing the need for dental care throughout the world.

General

TEMPESTUOUS SINGING STAR SCHEDULED FOR DALLAS OPERA

The opportunity to hear one of the most spectacular personalities of the music world is in store for American Dental Association delegates and their wives who attend the 99th annual session in Dallas in November.

Maria Meneghini Callas, celebrated diva, heads the roster of artists to appear in the Dallas Civic Opera Company's 1958 season, October 31 to November 8, in State Fair Music Hall. This will be her only opera engagement in America this fall.

Callas will sing in two of the season's three productions. She will star in the Dallas company's new production of Verdi's "La Traviata" in two performances, Friday evening, Oct. 31, and Sunday afternoon, November 2. The production will be directed by Franco Zeffirelli, directorial star of the La Scala Opera and the Holland Festival, with sets and costumes designed and executed in Milan and imported especially for the Dallas production.

Callas will be presented again on Thursday evening, November 6, and Saturday, November 8, singing the title role of Cherubini's "Medea," one of her

Maria Callas . . . diva

greatest European successes. This will be the first time she has sung the Medea role on this side of the Atlantic.

The third production of the Opera repertory, on Tuesday evening, November 4, will be a repeat performance of the Dallas company's 1957 triumph, Rossini's comic opera, "Italian Girl in Algiers," which drew acclaim from the nation's critics in Dallas last fall. The heroine, Isabella, will be sung by Teresa Berganza, new Spanish contralto star of European opera, who will be making her American debut.

The Dallas Civic Opera Company, now in its second season, has been called "the most spectacular musical development in America today." Its general manager is Lawrence Kelly, formerly of the Chicago Lyric Theatre, and its artistic director is Nicola Rescigno, who this summer conducted Mme. Callas' five London performances of "Traviata" as part of the 100th anniversary celebration of the Covent Garden Royal Opera House.

The country's major music critics, including those of *Time, Newsweek* and

other national magazines, and New York, Chicago and other metropolitan dailies, are expected to visit Dallas to review the fall opera season.

Dental convention visitors wishing to include the opera will be given special attention in making reservations. Mail orders should be addressed to the Dallas Civic Opera Co., 309 Browder St., Dallas 1, accompanied by check or money order in full and a stamped, self-addressed envelope for return of tickets. Notation should be made of the convention affiliation. Prices are: lower floor, $7.85 and $6; balcony, $7, $6, $5, $3.50 and $2. Special sections are designated for students, at reduced prices.

"Welcome Awards" to stimulate interest in the current, nationwide membership campaign of the American Dental Assistants Association will be presented to several new members at the group's annual convention in Dallas November 10-13. A.D.A.A. officials are shown explaining details of the drive to Lon W. Morrey, editor, THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION. From the left: Mrs. Dorothy Kowalcyzk; assistant executive secretary; Dr. Morrey; Mrs. Virginia Hoffman, public relations committee chairman, and Mrs. Janet Lindenberg, membership committee chairman.

DON C. LYONS INSTALLED AS PRESIDENT OF ACADEMY

Don C. Lyons was installed as president of the American Academy of Dental Medicine at the group's 12th annual meeting in Montreal, Canada, in late May.

Other officers elected were George G. Stewart, president-elect; Hermann Becks, vice-president; Harold Lavine, secretary; William M. Greenhut, treasurer; and Irving Yudkoff, editor of the *Journal of Dental Medicine*.

At an awards dinner on May 29, honorary memberships were conferred on Dr. Adelard Groulx, director of the City of Montreal Health Department, and Don Gullett, secretary of the Canadian Dental Association.

Marcel B. Archambault of Montreal was the outgoing president.

AMERICAN ACADEMY OF ORAL PATHOLOGY ELECTS OFFICERS

At the annual meeting of the American Academy of Oral Pathology in Washington, D. C., the following officers were elected and installed:

President, Charles Waldron; president-elect, Joseph Bernier; vice president, Robert Colby, and secretary-treasurer, Robert J. Gorlin.

Application for membership and fellowship in the organization may be made through the office of the secretary-treasurer. Please address inquiries to Robert J. Gorlin, secretary-treasurer, American Academy of Oral Pathology; School of Dentistry, University of Minnesota, Minneapolis 14, Minnesota.

SOCIETY OF ORTHODONTISTS ANNOUNCES OFFICERS

The Northeastern Society of Orthodontists will meet November 3 and 4 at the Queen Elizabeth hotel in Montreal, Canada.

The newly elected officers of the group are Walter R. Bedell, president; Wilbur J. Prezzano, president-elect; Henry C. Beebe, vice-president, and David Mossberg, secretary-treasurer.

Joseph D. Eby was elected sectional editor, Brainerd F. Swain, assistant editor; Leuman M. Waugh, historian; Nor-

man L. Hillyer, director; and Richard Lowy, alternate.

DENTAL MEDICINE INSTITUTE TO MEET IN PALM SPRINGS

The 15th anniversary meeting of the American Institute of Dental Medicine will be held in Palm Springs, Calif., October 12-16, 1958.

Speakers scheduled for the meeting will include authorities in the fields of oral medicine and endocrinology; Hans Selye, M.D., who will discuss his concept of stress; and S. I. Hayakawa, who will address the meeting on communication and related aspects of general semantics.

Information may be secured from Miss M. Lewis, executive secretary, 2240 Channing Way, Berkeley 4, Calif.

PHONY DENTISTS BANNED FROM TELEVISION COMMERCIALS

The broadcasting industry has barred the use of make-believe physicians, dentists and nurses to make sales pitches on television commercials.

The following amendment to the National Association of Broadcasters Television Code was approved by the NAB Television Board in June:

"Dramatized advertising involving statements or purported statements by physicians, dentists, or nurses must be presented by accredited members of such professions."

TRIBUTE PAID TO SWANSON ON OCCASION OF RETIREMENT

Clayton A. Swanson of Minneapolis, who is retiring after 34 years as chief of the dental department at Minneapolis General Hospital, was honored at a testimonial dinner in St. Paul on the evening of April 13.

Attending the dinner were 57 men from 16 states, the District of Columbia and Canada, who had interned under Dr. Swanson or were members of Swanson's Seminar, a study group named in his honor.

DINNER DANCE IN NEW YORK TO BE GIVEN FOR SCHUYLER

Clyde Schuyler, a well-known New York prosthodontist, will be the honor guest at a dinner dance on October 18 at the Starlight Roof of the Waldorf Astoria hotel in New York.

Reservations may be made through Clarence Dunn, 875 Fifth Ave., New York.

SIGMA EPSILON DELTA GIVES AWARD TO NAGLE

Raymond J. Nagle, dean of New York University College of Dentistry, received the honorary award of the Sigma Epsilon Delta dental fraternity May 14 at the Concord hotel in Kiamesha Lake, N. Y.

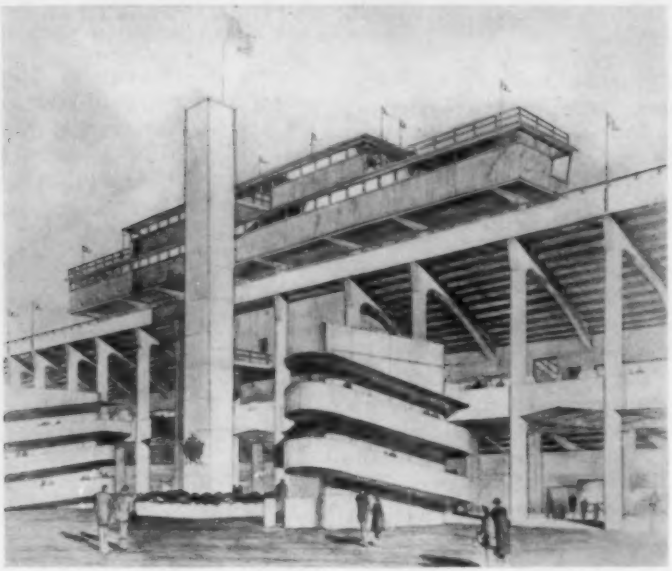
Dr. Nagle, who is the tenth recipient of the annual award, was honored for his contributions to dental education.

National Defense

NAVY DENTAL SERVICE MARKS 46 YEARS OF EXISTENCE

Rear Admiral Ralph W. Malone, head of the Navy's Dental Service, announced that on August 22, 1958, the Dental Corps will commemorate the 46th anniversary of its establishment. On that date in 1912, President William Howard Taft signed into law the Naval Appropriation Act which included a provision for appointing "not more than thirty assistant dental surgeons . . . to serve professionally the personnel of the Naval Service."

This infant Corps of 30 has grown to



This is one of approaches to Navy-Marine Memorial Stadium under construction at the U.S. Naval Academy in Annapolis, Md. One section of chairs in the vast stadium will memorialize 26 U.S. Navy dental officers who lost their lives during World War I, World War II and the Korean War. Each of the chairs in this section will bear plaques listing names and biographical data on the deceased heroes. Funds for the memorial are being contributed by civilian dentists, dental manufacturing firms, dental officers of the Regular Navy and Naval Reserve who are on active duty, and members of the Naval Reserve companies.

the present active duty strength of approximately 1,700 dental officers who are assisted by 3,300 enlisted dental technicians and 70 dental service warrant officers and medical service corps officers. This dental care team provides treatment for the men of the Navy and Marine Corps in 400 dental facilities throughout the world.

POST DENTAL CLINIC BECOMES DENTAL EDUCATOR'S MEMORIAL

John Sayre Marshall, Civil War soldier, eminent dental educator and the first senior member of the U. S. Army Dental Corps, was memorialized at Fort Dix, N. J., June 7 in the naming of the new post dental clinic at that station.

Representing the Office of The Surgeon General of the Army was Col. Leland G. Meder, assistant chief of the Dental Division. Colonel Meder made the memorial address after an introduction by Col. Edwin Van Dervort, post dental surgeon.

The exceptional accomplishments in American dentistry contributed by Dr. Marshall were cited by Colonel Meder as an inspiration for today's Army dentists in their efforts to give the finest professional care to their patients.

After service in the Civil War, Dr. Marshall obtained a medical degree and studied dentistry with local practitioners in New York State. He became best known as a teacher holding faculty posts at Northwestern University, Syracuse

University and the American College of Dental Surgery. Upon recommendation of the executive council of the National Dental Association, he was named by Army Surgeon General Sternberg in February 1901 to the governing body of the newly authorized Corps of Dental Surgeons. He was made president of the board and in April, 1911, was commissioned a first lieutenant, the highest rank then possible for a dental officer.

He retired from the Army in June 1911, and at that time was advanced in grade to captain because of his Civil War service. He continued his teaching and research at the University of California, Berkeley, after his retirement from the Army and died in that city on November 20, 1922, at the age of 76 years.

Research

PENNSYLVANIA RESEARCH LABS TO BE DEDICATED OCTOBER 4

The University of Pennsylvania will hold dedication ceremonies and a research program on Saturday, October 4, for the official opening of new research laboratories at the School of Dentistry. The expansion of research facilities includes the addition of three research laboratories by renovation and the construction of a three floor research laboratory building with complete animal room facilities. This was made possible by matching funds from the health research facilities program of the Department of Health, Education and Welfare, alumni of the school, and the University.

The program for the day will be climaxed by a dinner in honor of Joseph L. T. Appleton, dean emeritus and professor of microbiology. Dedication ceremonies will begin at 2 P.M. and will be followed by a series of research papers.

Reservations for the dinner may be directed to the Alumni Office, 4001 Spruce St., Philadelphia 4.

$13,759 GRANTED FOR DENTAL RESEARCH IN JUNE BY PHS

Research grants and fellowships totaling $1,721,245 were awarded during the month of June by the National Institutes of Health, the Public Health Service's research center at Bethesda, Md.

The National Institute of Dental Research was given a research grant of $5,934 and three fellowship awards totaling $7,825.

Research grants are awarded to nonfederal research institutions for the support of research projects in the health sciences. Research fellowships support both predoctoral and postdoctoral research training.

Also • Jose M. Gonzalez of San Juan has been named the Regional Consultant in Oral Hygiene to the Department of Health of Puerto Rico and is also the new president of the State Dental Board of Examiners of the Commonwealth. . . . The American Dental Association was awarded a citation by the University of Kansas City School of Dentistry for "the outstanding interest of its officials in the Dental Health of the American Public." . . . The Michigan State Dental Association has approved the bylaws of the Michigan Dental Service Corporation. . . . Lloyd H. Truax, Jr., has been appointed a member of the section of dentistry of the Mayo Clinic, Rochester, Minn.

The Reader Comments

THE JOURNAL *devotes this section to comment by readers on topics of current interest to dentistry. The editor reserves the right to edit all communications to fit available space and requires that all letters be signed. At the request of the author, signatures will be deleted before publication. Printed communications do not necessarily reflect the opinion or official policy of the Association. Your participation in this section is invited.*

The Editor

INDEPENDENT DENTAL LABORATORIES ASSOCIATION

During a meeting of the Joint Prosthetic Dental Service Committee of the Illinois State Dental Society, held at the Sheraton-Blackstone Hotel in Chicago June 4, 1958, the subject of the article appearing in the May issue of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION entitled "The Independent Dental Laboratories Association (an Illinois Corporation)" was discussed.

It was moved, seconded and passed unanimously that a letter of commendation be written to you, by me, on the above-mentioned article.

It was certainly most enlightening and interesting and the first and only article of this type I recall being published. I think you will agree that any infringement on our present methods of dental practice, by any subterfuge or by any organization, should be immediately and vigorously resisted with all the means at our command. To fail to do so would be a violation of the confidence of those whom we serve and whose dental health we are pledged to protect.

On behalf of the Prosthetic Dental Service Committee of the Illinois State Dental Society I wish to express again our commendation for your article and assure you that not only will it be of great assistance to the dental health of the public but it will also be of great assistance to those of us interested in prosthetic problems of the Illinois State Dental Society.

Lloyd H. Dodd, D.D.S., Chairman
Prosthetic Dental Service Committee
Illinois State Dental Society

The Joint Prosthetic Dental Service Committee of the Illinois State Dental Society and the Illinois Dental Laboratory Association wish to extend to you their most sincere compliments and congratulations on a recent article appearing in the May issue of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION titled "The Independent Dental Laboratories Association (an Illinois Corporation)."

The Committee reviewed this article in its entirety and find it to be of great value in making the dental community aware of an organization that has been in existence for a considerable time and of which none of us knew but very little.

Keep up this splendid work, and if we can in any way be of assistance to you, please call on us.

Edward W. Mauter
Executive Secretary
Illinois Dental Laboratory Association

MORE ON KASDENOL

Mr. J. L. Loesel of the Kasdenol Corporation seems disturbed by my recent article, "Evaluation of Kasdenol."[1] He charges my refusal to recognize previous publications laudatory of his mouthwash.

Except for suggestions that this product might be valuable for treatment of poliomyelitis or tuberculous cystitis, the papers are mainly reports of clinical trial on patients with many oral diseases. No attempt was made to control conditions of use. The mouthwash was used; the patient recovered; therefore, the mouthwash cured the patient.

The clinical experiment is the most difficult to interpret. The differences in individuals, habits, tissues and the natural healing powers bring an infinite number of variations which make interpretation difficult. For example, it has been reported that the use of Kasdenol healed herpetic ulcers in a week. The average healing time for untreated herpetic ulcers is 2-7 days. A combination of laboratory, animal and carefully controlled clinical experiments is necessary to appraise new drugs.

Mr. Loesel writes, "Kasdenol is definitely not a proprietary product." A proprietary by definition is any chemical, drug or similar preparation used in the treatment of diseases, if such an article is protected against free competition as to name, composition or process

of manufacture by secrecy, patent or any other means.[2]

The terms Kasdenol, Clorpactin, WCS 90, or monoxychlorosene are not listed in the *U. S. Pharmacopeia, National Formulary, Accepted Dental Remedies,* or *Merck Index.* If it consists of calcium hypochlorite which is mentioned on the package, this can be readily purchased at a fraction of the cost of Kasdenol. However, the composition is secret.

The dentist is legally responsible for the materials he uses or prescribes. Trained in therapeutics, he knows that a medicament suitable for one individual may be useless or harmful to another. He must know, therefore, the composition and dosage of such substances.

The writer has no wish to harm the Kasdenol Corporation. However, it is the duty of those of us who have the facilities for testing to assess objectively the sometimes too enthusiastic claims of the manufacturer. Otherwise dentistry would be at the mercy of commercial interests.

S. Leonard Rosenthal, D.D.S.
Professor of Oral Diagnosis
Temple University School of Dentistry

1. Rosenthal, S. L. Evaluation of Kasdenol (Clorpactin). J.A.D.A. 56:692 May 1958.
2. New Gould Medical Dictionary. Philadelphia, Blakiston, 1949.

SOCIAL RESEARCH REPORT

Not since the publication of the June 1951 JOURNAL devoted to "An Evaluation of the Effect of Dental Foci of Infection on Health" have I been so enthusiastic over anything I have found in a dental magazine as I am over the Social Research, Inc., report published in the March, April, May and June issues of dentistry's most distinguished periodical. This is journalism at its best, at its very best, as was the June 1951 contribution.

You may be more or less vaguely aware of the fact that I have been contending for years that dentistry's greatest weakness and biggest failure lies in the department of public relations. This Social Research, Inc., report is a first firm step in the right direction. Who thought of doing it: If I knew who it was I would like to congratulate and encourage him. Also I would like to know who wrote this report. I want to meet the man sometime. Whoever he is, he has intelligence, common sense, and courage. Quite a combination of virtues.

Will the report be published in reprint form? I hope so, and if it is, please advise me how I may order several copies.

This work is too good to let die on the vine We should follow through, not too fast, not recklessly, but relentlessly.

Again, congratulations to you as the editor. Too bad the report could not have been given more prominence; but perhaps, in tribute to conservatism, the gentler way you handled it may be the right way.

Howard R. Raper, D.D.S.
Albuquerque, N.M.

A BRUSH WITH THE TOOTHBRUSH

I used to advise those willing to listen to brush their teeth three times a day, without suggesting any particular method.

Then I heard about the merits of the circular motions with the brush, which give to the tissues and the teeth all they need in hoped-for cleanliness, and so I specified my advice thereafter. Hardly was this accepted, when there appeared an item in your columns by Dr. Garleb, challenging other procedures, and strictly advising horizontal brushing. Other methods had been proven failures. The experiences quoted were convincing, and the advice so definite that I revoked all previous orders in favor of horizontal brushing henceforth.

In the January issue of THE JOURNAL, the method was debunked by Dr. Miller in favor of vertical brushing. Again, much experience and logic, but by now there was cause to be hesitant before changing previous orders, and I decided to make a little survey of the bristling issue by questioning the next few individuals I came across, with perfect teeth and gums.

I soon met an elderly male from Cyprus, with all his teeth, no fillings, and perfect gums. Disappointingly, he confessed he had never owned a toothbrush in his life. The next few encountered with perfect teeth gave similarly no clue, having had no brushing experience.

To follow through by calling off all brushing seemed inexpedient; consider what, if generally accepted, this would do to the economy and to tooth-cream ads in a time of declining prosperity. Thus, a compromise decision was reached, and this is what I am advising now: diagonal brushing. The technic of oblique brushing is difficult, but worth the effort; what it has done so far in over three weeks of clinical experience, and the results in caries reduction, have been truly unbelievable.

H. H. Neumann
School of Dental and Oral Surgery
Columbia University
New York

Cases and Comments

FACIAL FIBROUS DYSPLASIA

By A. P. Chaudhry, B.D.S. (India), M.S., Ph.D.; Robert J. Gorlin, D.D.S., M.S., and Roger J. Burke, D.D.S., Minneapolis.

The use of the term "fibrous dysplasia" was initiated by Lichtenstein[1] in 1938 to designate bone lesions resulting from perverted activity of bone-forming mesenchymal tissue. These lesions are composed of fibroblasts and fibrous connective tissue with varying degrees of chondroblastic and osteoblastic activity. Lichtenstein and Jaffe[2] classified under the term "fibrous dysplasia" bone lesions that are found in the literature under 33 different names.

Fibrous dysplasia may be monostotic or polystotic. The polystotic variety may be accompanied by brown pigmentation of the skin and precocious puberty in females (Albright's syndrome). Although numerous reports of instances of monostotic fibrous dysplasia of facial bones have been published, only a few instances of fibrous dysplasia of the polystotic variety have been reported. Thoma[3] prefers the term "facial fibrous dysplasia" for instances in which there is involvement of more than one facial or cranial bone.

REPORT OF A CASE

A 28 year old white woman was referred to the University of Minnesota School of Dentistry by her dentist because of swelling of her left cheek. She first noticed the swelling ten years previously, after the extraction of an abcessed lower left second molar. The swelling had increased in size very gradually and had caused no discomfort. Due to the asymptomatic nature of the lesion, the patient had not sought treatment or advice.

Her history indicated that menstruation started at approximately 13 years of age. She gave no family history of tuberculosis, syphilis or cancer.

Physical examination showed the patient to be well developed and well nourished and to have apparent facial asymmetry. The left side of her face was larger than the right side (Fig. 1). The mandible, maxilla and the zygomatic and frontal bones were more prominent on the patient's left than on her right side. The left eye was at a slightly lower level than the right eye, due to pronounced thickening of the superior orbital ridge on the left side. The swelling was diffuse, bony hard and fixed. The overlying skin was freely movable and normal. There was no evidence of café-au-lait spots on any part of the body. Intraoral examination revealed only bulging of the cortical plates of the left sides of the mandible and the maxilla. The teeth in the region involved were firm in their sockets and in good condition. The overlying mucosa was normal and intact.

Roentgenographic examination of the bones revealed a combination of radiolucent and radiopaque areas in the body and the ascending ramus of the left side of the mandible, giving it a multilocular appearance (Fig. 2). The bony septums separating the cyst-like spaces were irregular in shape and size. The left maxillary sinus was obliterated, and the disease seemed to be extending into the left side of the nasal cavity (Fig. 3). There was evidence of involvement of the frontal bone, with the frontal sinus being obliterated completely. The roentgenographic appearance was highly suggestive of facial fibrous dysplasia.

To confirm the diagnosis, an intraoral biopsy specimen was taken from the mandible. Histopathologic examination of the specimen showed it to be composed of fibrous connective tissue, with varying degrees of cellularity, interspersed with osteoid tissue and bone spicules (Fig. 4). The histopathological diagnosis was consistent with the clinical impression and the roentgenographic interpretation.

Because of the quiescence, the extensiveness and the asymptomatic nature of the disease, no treatment was instituted.

DISCUSSION

Fibrous dysplasia is more common in females than in males and more common in the first and second decades of life. The polystotic variety may or may not be accompanied by extraskeletal manifestations. The disease is self-limiting. It usually develops early in life, pursues an active course at puberty and then gradually becomes static. It may be entirely asymptomatic or may cause local tenderness

From the divisions of oral pathology and oral surgery, School of Dentistry, University of Minnesota.

1. Lichtenstein, L. Polystotic fibrous dysplasia. Arch. Surg. 36:874 May 1938.

2. Lichtenstein, L., and Jaffe, H. L. Fibrous dysplasia of bone. Arch. Path. 33:777 June 1942.

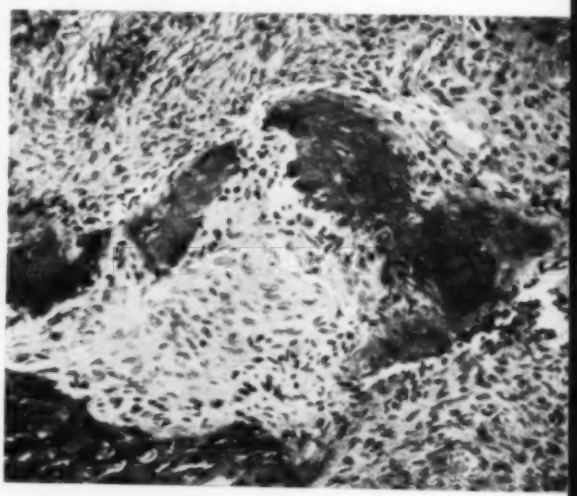
3. Thoma, Kurt H. Oral pathology, ed. 4. St. Louis, C. V. Mosby Co., 1954, p. 768.

Fig. 1 • Facial asymmetry produced by facial fibrous dysplasia. Note enlargement of frontal bone, superior orbital ridge, molar region and mandible on left side

Fig. 2 • Multilocular appearance of left side of mandible

Fig. 3 • Roentgenogram showing involvement of maxillary sinus, nasal cavity and frontal sinus on left side

Fig. 4 • Photomicrograph of biopsy specimen from left side of mandible. Note whorls of fibrous connective tissue interspersed with atypical bone spicules



or pain due to rapid destruction of bone, which may result in pathologic fractures.

The roentgenographic appearance depends on the histological components of the lesion. In the early stage, the disease gives mainly a radiolucent appearance, due to the predominance of connective tissue over bone. As the disease process continues, there is increased deposition of bone and the appearance becomes increasingly radiopaque. A similar histological picture may be seen in fibro-osseous lesions of a neoplastic nature.[4,5] Differential diagnosis between lesions of fibrous dysplasia and neoplastic fibrous lesions must be made by careful evaluation of the clinical course, the roentgenographic appearance and the histopathological picture of the disease, all combined.

4. Waldron, C. A. Ossifying fibroma of the mandible. Oral Surg., Oral Med. and Oral Path. 6:467 April 1953.
5. Thoma, Kurt H. Differential diagnosis of fibrous dysplasia and fibro-osseous neoplastic lesions of the jaws and their treatment. J. Oral Surg. 14:185 July 1956.

CLASS II CAVITY PREPARATIONS IN MANDIBULAR FIRST BICUSPIDS

By Edgar Gordon, D.D.S., London, England.

Class II cavity preparations in mandibular first bicuspids present extra difficulties because of the special anatomy of these teeth.

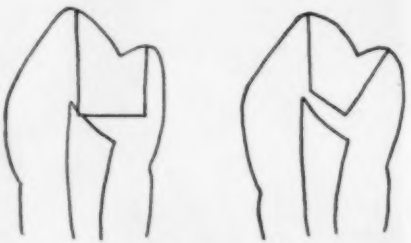
The mandibular first bicuspid often resembles the cuspid in its general outline. It has two cusps, a buccal and a lingual, the lingual cusp being very much smaller and on a lower occlusal plane than the buccal. A median ridge of enamel which varies in extent connects the two cusps. If the ridge is very pronounced, there are two depressions on either side of it. If there is no such ridge, the tooth looks very much like a cuspid and the slight depression between the two cusps lies far to the lingual aspect of the tooth.

The pulp is relatively large and follows the general contour of the crown. There is practically always a cornu extending into the buccal cusp.

Two difficulties arise in preparing a Class II cavity in a mandibular first bicuspid. The first is because of the relative weakness of the lingual cusp if the prepared cavity includes dental tissue evenly on both sides of the ridge. If the preparation is for a gold inlay and there is a well-defined connecting ridge of enamel, then the prepared cavity need not extend beyond this connecting ridge because of the inherent properties of gold. If the ridge is diminutive or absent, however, both depressions will have to be included for extension. An amalgam restoration would have to be bulkier, and its use would necessitate cutting into the connecting ridge of enamel whether the ridge is pronounced or not.

To prevent a weak lingual cusp, the cutting should be done at the expense of the buccal cusp, utilizing as little of the tissue on the lingual side as possible. If the preparation is for an inlay, a pronounced cavosurface bevel over the lingual cusp will give added protection.

The second difficulty is in preventing exposure of the dental pulp at the point where it rises into the buccal cusp. This can be prevented only by positioning the handpiece in a lingual direction and running the bur as if the tooth were leaning into the dental arch. This technic will leave an undercut under the buccal cusp, and, after the elimination of this undercut, the occlusal floor will remain tilted and so exposure of the pulp will be avoided.



Left: Class II preparation showing weak lingual cusp and horizontal floor of preparation resulting in pulpal exposure. Right: Class II preparation which retains support of lingual cusp and which has a sloping floor

Prevention and control of staphylococcus infections in hospitals:[1] bulletin 1

The following bulletin was prepared by the Council on Professional Practice's Committee on Infections Within Hospitals of the American Hospital Association. It was approved by the Board of Trustees of that organization, and was sent to all hospitals listed by the American Hospital Association.

Because of the increasing problem of staphylococcal infections in hospitals and the consequent need to call the recommendations in the bulletin to the attention of all persons in the health field, THE JOURNAL is glad to make this information available to the dental profession.

KNOWLEDGE OF CURRENT SITUATION

1. It is clear that throughout the world, in spite of the enormous success of antibiotics (and, as will be mentioned below, to some extent because of this success) there remains an important problem of infections, a problem of special significance for hospitals. This report is concerned with such infections, particularly those caused by the coagulase-producing strains of *Staphylococcus aureus hemolyticus*. The most obvious examples are impetigo and more severe infections in children, puerperal mastitis in recently delivered women, burn and postoperative wound infections, and pneumonia in debilitated patients. The staphylococcus may also be responsible for osteomyelitis, meningitis, septicemias, empyemas, boils and abscesses, otitis media, paronychiae, etc.

Disease-producing staphylococci frequently implant in the nasopharynx without overt disease, thus producing carriers. Indeed, the staphylococcus carrier-rate is a good index of the level of contamination of the environment.

2. Many hospitals have a serious problem with staphylococcus infections, and all hospitals have a potential problem. Information is inadequate as to the incidence of staphylococcus infections which are acquired in hospitals, but there is evidence that the number of such infections is increasing.

3. There appear to be innumerable strains of staphylococcus capable of producing infections. Many of these staphylococci are susceptible to antibiotics. Some are not. Infections with antibiotic-resistant staphylococci constitute the main difficulty. Hospitals are clearly the reservoir of most antibiotic-resistant strains. Strains from the community at large are predominantly sensitive to antibiotics. The strains carried by patients on admission are less frequently resistant than

This bulletin was prepared by the Council on Professional Practice's Committee on Infections Within Hospitals consisting of Dean A. Clark, M.D., chairman; William A. Altemeier, M.D.; C. P. Cardwell, Jr.; James P. Dixon, Jr., M.D.; Maxwell Finland, M.D.; Horace L. Hodes, M.D.; Martha Johnson, R.N.; and Alexander D. Langmuir, M.D., in consultation with Kenneth B. Babcock, M.D., of the Joint Commission on Accreditation of Hospitals; William H. Stewart, M.D., of the Public Health Service, and others.

1. The Committee on Infections Within Hospitals is charged with the responsibility of recommending American Hospital Association policies and programs on the prevention and control of all infections within hospitals. Because of the general interest in the problem, this bulletin is devoted to the staphylococcus. Two earlier bulletins on Asian influenza have been distributed.

strains which are acquired in hospitals. Patients who acquire these infections in the hospital are potential spreaders of resistant strains to the community after discharge. One of the major factors in the current situation is the widespread use of antibiotics which eliminates susceptible strains of staphylococcus and leaves uncontrolled the resistant strains.[2]

4. Certain factors frequently found in hospitalization appear to make patients more likely to acquire such staphylococcus infections: a) routine indiscriminate use of antibiotics, especially for "prophylaxis"; b) long hospital stay; c) contact, direct and indirect, with infected hospital patients, staff members or personnel; d) crowding and inadequacy of facilities; e) prolonged operative procedures; f) prolonged use of continuous parenteral therapy through venipunctures or indwelling plastic tubing.

5. Certain factors in the host (patient) appear to increase susceptibility to infection: a) treatment with adrenocortical steroids; b) physical debility; c) chronic disease; d) prematurity; e) diabetes; f) bed sores; g) open wounds or breaks in the skin; h) chronic pulmonary disease.

6. Danger of infection seems to be especially great from direct exposure to people infected with the staphylococcus, although exposure to the same organisms in or on contaminated equipment, supplies, dressings, air, dust, wall or floor surfaces, linens, etc., may be equally as important. The physician, nurse or other attendant with a boil, paronychia, abscess, or nasopharyngeal infection with a virulent strain is particularly hazardous.

RECOMMENDATIONS

I. All hospitals should establish Committees on Infections, to devote particular attention to infections which are acquired in hospitals so they may be reduced to the lowest possible minimum.[3]

A. It is suggested that the Committee on Infections include, where possible, a bacteriologist, a pediatrician, a surgeon, an internist, a nurse, and a hospital administrator. The local health officer should be urged to serve as a consultant to the committee. The committee should report periodically to the executive committee of the medical staff.

B. The functions of the Committee on Infections should include at least the following:

1. To establish a system of reporting infections among patients and personnel, such a system being essential to a proper understanding of infections which are acquired in hospitals. The committee should have access to all reports of infections anywhere in the hospital.

2. To keep records of infections as a basis for the study of their sources and for recommendations regarding remedial measures.

3. To distinguish to the best of its ability between infections acquired in the hospital and those acquired outside.

4. To review the hospital's bacteriological services to make sure that such services are of high quality and are accessible either in the hospital itself or in an outside laboratory. Bacteriophage typing, if not available in the hospital, may be sought, as needed, through official local and state health agencies.

5. To review aseptic techniques employed in operating rooms, delivery

2. It is not known whether resistant strains of this organism actually acquire resistance after exposure to the antibiotics, or are resistant to begin with and are simply unmasked by the suppression of susceptible strains—although the latter is thought to be the case. From a practical point of view, it does not matter which theory is correct.

3. The Joint Commission on Accreditation of Hospitals is being asked to consider the establishment of a Committee on Infections as a major factor in the accreditation of a hospital. Bulletin 17 of the Joint Commission contains recommendations on the subject.

rooms, nurseries, and in the treatment of all patients with infections and, if indicated, to recommend methods to improve these techniques and their enforcement.

6. To make vigorous efforts to reduce to the minimum consistent with adequate patient care:

a) Use of antibiotics, especially as "prophylaxis" in clean, elective surgery

b) Treatment with adrenocortical steroids

7. To undertake an educational program to convince medical staff and hospital employees of the importance of reporting to responsible authorities when they have skin infections, boils, acute upper respiratory infections, and the like.

8. To establish techniques for discovering infections which do not become manifest until after discharge from the hospital, it being known that such infections are often overlooked because they may not be apparent until several weeks after the patient has left the hospital. Two approaches to discovering such infections are suggested:

a) An attempt to trace the source of any infection with which a patient may be admitted. For example, if an infant is admitted with staphylococcal pneumonia or a recently delivered mother with mastitis, the hospital where delivery occurred should be determined and informed of the infection so that it can seek possible sources of infection.

b) Periodic telephone polls on a random sample of discharged patients (particularly recently delivered mothers, newborns, and postoperative patients) to ascertain their state of health and, in case of any indication of infection, to follow them up. Such surveys have proved quite simple and quite valuable. A detailed account of the method is given by Ravenholt and others in the October 1956 issue of the American Journal of Public Health.

II. Hospital administration should undertake the following measures to assist in the control of infections:

A. Diligent maintenance of the general cleanliness of *all* areas in the hospital, not simply in those associated with operating rooms, delivery rooms, and nurseries. Other possible sources, such as dust, air pollution (special attention should be given to ventilating and air-conditioning systems and their filters), and floors must also be considered as potentially important factors in the spread of infection. There should be regular inspections of the hospital for general cleanliness.

B. Special studies among staff and personnel to uncover silent carriers of staphylococcus, especially in epidemic situations accompanied by repeated cases traceable to the same organism.

C. Appropriate measures for the treatment of all carriers who persistently show heavy growth of epidemic strains of staphylococcus in nasopharyngeal cultures or who are identified by epidemiological evidence.

D. Transfer of such carriers and personnel with skin infections, boils, acute upper respiratory infections, and the like from locations such as operating rooms, delivery rooms, food-handling positions, and nurseries to other duty stations in the hospital. Usually such transfers have proved to be sufficient to control the problem, but occasionally leave of absence for a persistent carrier has been necessary.

III. Hospitals should initiate or participate in community programs to control infection through cooperation with other hospitals, local medical societies, local health departments, and other groups.

GENERAL COMMENT

1. Occasionally, an entire hospital, a whole community, or a large area seems to become subject to an epidemic strain of staphylococcus. Why this occurs is not known. Its occurrence, however, points up the need for more general recognition and study of staphylococcus infections.

2. Among the agencies from which consultation and assistance concerning infection problems may be sought are the following:

a) The American Hospital Association, the American College of Surgeons, and the American Academy of Pediatrics (especially for newborn infants) which will furnish upon request the names of suitable consultants.

b) Local and state health departments which, in many instances, have experts on their staffs.

c) The Communicable Disease Center of the U. S. Public Health Service, Atlanta, Georgia, whose assistance may be obtained through local and state health departments.

3. Valuable background information and discussion about the infection problem can be found in:

a) Conference on staphylococcal infections. (Symposium) Journal of the American Medical Association. 166: 1177-1203, March 8, 1958; (Editorial p. 1205)

b) Observations relative to the nature and control of epidemic staphylococcal disease. F. H. Wentworth and others. American Journal of Public Health. 48:287-98, March 1958

c) New York (State) Department of Health Guide for the prevention and control of infections in hospitals. Albany; 56p. illust. 1957

d) New York Academy of Science. Staphylococcal infections: a symposium. The New York Academy, 1956. 57-246 p. illust., tables. (Annals of the New York Academy of Sciences, 65: 57-246)

e) The problem of postoperative wound infection and its significance. W. A. Altemeier. Annals of Surgery, 147:770 1958.

Fitness of American youth

C. Willard Camalier, D.D.S., Washington, D. C.

Shortly after Dwight D. Eisenhower became President of the United States, it was called to his attention that the youth of America had physical and other deficiencies which should be corrected if the health of present and future generations of the American people were to be maintained and enhanced wherever possible. This was strongly indicated because of the large number of rejections for physical defects during World War II and the failure of American athletes in some phases of the Olympic games. To consider this problem, the President called a Conference at the U. S. Naval Academy at Annapolis, Md., June 18-19, 1956. As a result of the findings of that Conference, he established by Executive Order under date of November 21, 1957, the President's Council on Youth Fitness and the President's Citizens Advisory Committee on the Fitness of American Youth. The reasons given for the issuance of the Executive Order were as follows:

1. Recent studies, both private and public, have revealed disturbing deficiencies in the fitness of American youth.
2. Since the youth of our Nation is one of the greatest of our assets, it is imperative that the fitness of our youth be improved and promoted to the greatest possible extent.
3. Such fitness is the responsibility of the government at all levels, as well as the responsibility of the family, the school, the community, and other groups and organizations.
4. It is necessary that the activities of the Federal Government in the area be coordinated and administered so as to assure their maximum effectiveness and to provide guidance and stimulation.
5. A comprehensive study and a reevaluation of all governmental and nongovernmental programs and activities relating to the fitness of youth are necessary in the interest of achieving and maintaining higher standards of youth fitness.

The President's Council on Youth Fitness is composed of the Secretary of the Interior, the Secretary of Defense, the Secretary of Agriculture, the Secretary of Labor, the Secretary of Health, Education and Welfare, with the Vice-President of the United States as its first chairman. Mr. Nixon has since resigned because of the pressure of other official duties. Secretary Fred A. Seaton, Department of the Interior, is now chairman. Dr. Shane MacCarthy was appointed executive director of the Council on September 6, 1956. In addition to the director, the staff is composed of Mr. G. Ott Romney, deputy, three staff members and seven others in clerical positions.

The President's Citizens Advisory Committee on the Fitness of American Youth is composed of approximately 120 members distributed throughout the United States, and represents persons and organizations interested in all phases of youth fitness. C. Willard Camalier, past president of the American Dental Association and assistant secretary, is the present representative of the dental profession. Mr. Carter Burgess, New York City, is the chairman of the Advisory Committee.

Assistant secretary, American Dental Association. Member, President's Advisory Committee on the Fitness of American Youth.

The first meeting of the President's Citizens Advisory Committee with the Council was held in West Point, N. Y., September 9-10, 1957, the authority therefor being embodied in that portion of the Executive Order which stated:

The Council shall be the President's official link with the Advisory Committee. The Council shall meet with the Advisory Committee at least once a year for the purpose of determining the progress made with respect to the problems relating to the fitness of American youth, and, taking into account the results of such meetings and other factors, shall prepare and present reports on this subject to the President.

As a result of the West Point Conference, a report dated November 25, 1957, was made to the President of the United States by Vice-President Nixon, then chairman of the Council, with certain recommendations for action as follows:

1. That youth-serving organizations and all related groups reappraise their own programs to assure that (a) they are giving proper emphasis to fitness and (b) that they are using the best-known techniques in so doing.
2. The Council use its resources and influence to strengthen existing organizations serving youth.
3. Organizations with specialized functions develop a program to educate parents on their individual responsibilities to guide their children in establishing personal desires for fitness, utilizing available resources of each community.
4. The Council encourage closer cooperation between all youth-serving organizations in the development of youth fitness programs, with an emphasis that all youth have periodic health examinations and dental inspections.
5. Adequate and equal consideration be given to the physiological and mental aspects of health.

It was emphasized that the Council should continue to elicit the cooperation of organizations, both private and public, that have experience in the field of youth fitness and this would, of course, include the American Dental Association. Further recommendations included:

1. That Governors call state conferences on fitness of American youth and that mayors or other responsible civic officials call similar conferences to advise individuals, formulate programs, and stimulate interest in youth fitness.
2. That leadership of certain communities in their youth fitness action be recognized so as to serve as stimuli to other communities and agencies.
3. Every school have a continuing program which tests the fitness of youth, develops favorable attitudes toward sound body and healthy personality, and gives attention to the correction of physical, emotional, and mental maladjustments and defects.
4. In implementing any youth fitness action program, consideration be given to the need for additional Federal and State legislation.
5. The Council encourage and assist communities to make greater use of information, materials, and research findings available through the various Federal, State and local departments and private agencies in order to broaden community resources for youth fitness.
6. A workable means be devised for arranging with youth-serving agencies for youth participation in national, state, and local conferences formulating and promoting fitness programs.

Additional recommendations were:

1. Youth fitness objectives be identified to the several target areas such as youths themselves, parents, youth groups, community, fraternal, civic, industrial, and other groups, with the parents receiving primary attention.
2. The significance of the program be signalized to the Nation, as well as to the youths themselves, by a concise and realistic definition of mission and by developing materials explaining the "whyness" of youth fitness.
3. A variety of implementing mechanisms be utilized, such as news stories, statements via inspirational leadership, slogans, fact sheets, cartoons, and pictures—this material to be developed by and through all media, supplementing groups and the Council itself.
4. Citations of the need for youth fitness be incorporated in the public statements of prominent Government officials in so far as appropriate and feasible.
5. The deep concern and active interest of the President be dramatized by way of a national radio-TV broadcast to the Nation calling for action programs.

The dental representative noticed at the West Point meeting that health matters seemed to be minimized as compared with physical exercise and competitive

contests. He found it necessary, therefore, to emphasize the health angle quite strongly. As a consequence, dentistry was included in the report, with emphasis placed on health education and dental inspections in schools and private dental offices. The suggestion that "The Council should take cognizance of the important part that dental health occupies in the fitness of our youth" was included in the report and it is now believed that these efforts and those of the representatives of the American Medical Association will bring the health phases of youth fitness more prominently into the program.

FUTURE PLANS

During the first year of operation, the major tasks of the Council were to alert the nation and to interpret the story of youth fitness in such dimensions that all groups—government, medical, dental, education, civic, labor, fraternal, religious, and others—were encouraged to recognize clearly the need for added emphasis on fitness.

Existing organizations were encouraged to reappraise and reevaluate their own programs to meet the challenge of improving fitness, especially of our youth.

Although making the nation aware of fitness will continue to be a prime objective of the President's Council, the Council moves now into the period of expanding action on the part of communities, organizations and individuals.

The main Council activity will be to urge organizations and individuals to appraise and take further action to improve fitness of youth, with emphasis on physical activity.

LONG-RANGE GOALS

The following long-range goals were outlined.

1. To Increase the Stature of Physical Education • Physical education should be clearly recognized as an integral part of the school curriculum, with constant effort to improve leadership, programs and facilities.

2. To Encourage the Expansion of Health Education • Adequate health education, including nutrition, should be considered a significant part not only of all school curriculums but also of school-community health programs so that children will be encouraged to put into practice the health concepts learned in school.

3. To Encourage Continuing Health Supervision • Education and recreation activities directed to the improvement of fitness should be adapted to the medical interpretation of the child's capacities to participate in various fitness activities. Continuing health supervision should be available to all children, either by the family physician and dentist or through a community resource. Parents should be motivated to seek correction of physical and dental defects found to be present in their children.

4. To Harness All Resources • Of prime importance to the achievement of these long-range goals, based on the considerations given previously, is the over-all goal of harnessing all public and private agencies, with their special skills and knowledge, to work together toward the ends described.

IMMEDIATE COUNCIL ACTION

In line with the basis for action and the long-range goals, the Council, through appropriate action, will strive to implement its program in the following manner.

1. Create National Awareness of the Need for Youth Fitness • The Council will strive to obtain increased active support of interested organizations to pub-

licize the need for improving fitness programs.

2. *Encourage Community Activity* • Existing organizations concerned with youth at the state and local level should incorporate youth fitness programs within their activities. Where such organizations are nonexistent, the formation of youth fitness committees will be promoted. The Council will serve as a clearing house of information received from states and localities about their programs to improve the fitness of youth and will provide guidance to communities establishing such programs.

3. *Encourage the Increased Cooperation of the Professionals in the Field* • The Council will promote cooperation among professional personnel from the various fields so as to attain the greatest possible participation by youth in wholesome fitness programs. The Council and the Citizens Advisory Committee will continue to provide liaison with national organizations and governmental agencies working toward the achievement of this goal.

4. *Emphasize Fitness in the Elementary Schools* • Since the foundation for healthful living is laid during the elementary school years, an opportunity should be offered in the early years for the acquisition of proper attitudes toward and habits of physical activity and health practice. Increased attention must be directed toward the recognition, expansion and improvement, where necessary, of physical education in the elementary schools, as well as of health education.

RESOURCES FOR ACTION

A planned program of action to achieve the long-range goals and immediate action objectives of the Council requires the enlistment of the resources of federal, state, and local governments, as well as those of nongovernmental organizations. Such resources include: the federal government; state and local governments; national, state and local professional organizations and voluntary agencies, under which falls dental, medical and other health groups; civic and other groups, such as labor, management, agriculture, religious, fraternal, service, patriotic, and parent and youth organizations.

Inasmuch as it has been estimated that 90 per cent of young people between the ages of 3 and 20 have diseased, missing or filled teeth, dental health becomes an important aspect of the problem of the fitness of youth. Theoretically, then, every member of the dental profession should become an active member of the fitness team cooperating with the President's Council on Youth Fitness. To be of assistance in this worthwhile program, it is suggested that all state and component societies of the American Dental Association cooperate with any youth fitness programs in operation in the respective communities, probably through their councils on dental health; first, by seeing to it that a member or members of the dental profession are on state and local fitness committees, and, second, by aiding in establishing and implementing dental programs in public and private schools, correctional and mental institutions. In order that an estimation may be made of the present scope of the dental representation in the Youth Fitness Program throughout the United States, it is requested that information regarding the communities be forwarded by the secretary of the state and local societies as promptly as possible to C. Willard Camalier, Suite 202, 806 Connecticut Ave., N.W., Washington, D. C.

COUNCIL ON DENTAL EDUCATION

Accredited dental schools

All of the dental schools that have been approved or provisionally approved by the Council on Dental Education are accredited. The schools in the following list designated with an asterisk (*) are provisionally approved. Those designated with a double asterisk (**) are new and have not yet been visited for accreditation purposes. The others are approved.

Alabama

School of Dentistry
University of Alabama
1919 Seventh Avenue, South
Birmingham 3
Dean, Joseph F. Volker

California

School of Dentistry
College of Physicians and Surgeons
344 Fourteenth Street
San Francisco 3
Dean, John Tocchini

School of Dentistry
University of California
The University Medical Center
San Francisco 22
Dean, Willard C. Fleming

School of Dentistry
University of Southern California
925 West Thirty-fourth Street
Los Angeles 7
Dean, Robert W. McNulty

School of Dentistry
College of Medical Evangelists
Loma Linda
Dean, M. Webster Prince

District of Columbia

School of Dentistry
Georgetown University
3900 Reservoir Road, N.W.
Washington 7
Dean, Clemens V. Rault

College of Dentistry
Howard University
600 W Street, N.W.
Washington 1
Dean, Russell A. Dixon

Georgia

School of Dentistry
Atlanta-Southern Dental College
Emory University
106 Forrest Avenue, N.E.
Atlanta 3
Dean, John E. Buhler

Illinois

Chicago College of Dental Surgery
Loyola University
1757 West Harrison Street
Chicago 12
Dean, William P. Schoen

The Dental School
Northwestern University
311 East Chicago Avenue
Chicago 11
Dean, George W. Teuscher

College of Dentistry
University of Illinois
808 South Wood Street
Chicago 12
Dean, Isaac Schour

Indiana

School of Dentistry
Indiana University
1121 West Michigan Street
Indianapolis 2
Dean, Maynard K. Hine

Iowa

College of Dentistry
State University of Iowa
Dental Building
Iowa City
Dean, William J. Simon

Kentucky

School of Dentistry
University of Louisville
129 East Broadway
Louisville 2
Dean, Raymond E. Myers

Louisiana

School of Dentistry
Loyola University
6363 St. Charles Avenue
New Orleans 18
Dean, Frank J. Houghton

Maryland

Baltimore College of Dental Surgery
The Dental School
University of Maryland
618 West Lombard Street
Baltimore 1
Dean, Myron S. Aisenberg

Massachusetts

Harvard School of Dental Medicine
25 Shattuck Street
Boston
Dean, Roy O. Greep

Tufts University
School of Dental Medicine
136 Harrison Avenue
Boston 11
Dean, Cyril D. Marshall-Day

Michigan

School of Dentistry
University of Detroit
630 East Jefferson Avenue
Detroit 26
Dean, Rene Rochon

School of Dentistry
University of Michigan
Ann Arbor
Dean, Paul H. Jeserich

Minnesota

School of Dentistry
University of Minnesota
Washington Avenue & Union Street, S.E.
Minneapolis 14
Dean, William H. Crawford

Missouri

Kansas City-Western Dental College
School of Dentistry
The University of Kansas City
1108 East Tenth Street
Kansas City 6
Dean, Hamilton B. G. Robinson

School of Dentistry
St. Louis University
3556 Caroline Street
St. Louis 4
Dean, Stephen P. Forrest

School of Dentistry
Washington University
4559 Scott Avenue
St. Louis 10
Dean, Leroy R. Boling

Nebraska

School of Dentistry
The Creighton University
26 and California Streets
Omaha 2
Dean, Benjamin L. Lynch

College of Dentistry
University of Nebraska
Lincoln 8
Dean, Ralph L. Ireland

New Jersey

**School of Dentistry
Fairleigh Dickinson University
Teaneck
Dean, Walter A. Wilson
(First freshman class was enrolled in the Fall of 1956. School will be evaluated during 1958-59 school year)

College of Dentistry
Seton Hall University
Jersey City Medical Center
Jersey City
Dean, Merritte M. Maxwell
(First two years are approved. First graduating class will be in 1960)

New York

School of Dental and Oral Surgery
Columbia University
630 West 168 Street
New York 32
Dean, Gilbert P. Smith

College of Dentistry
New York University
209 East Twenty-third Street
New York 10
Dean, Raymond J. Nagle

School of Dentistry
University of Buffalo
3435 Main Street
Buffalo 14
Dean, Leon J. Gauchat

North Carolina

School of Dentistry
University of North Carolina
Chapel Hill
Dean, John C. Brauer

Ohio

College of Dentistry
The Ohio State University

Columbus 10
Dean, Wendell D. Postle

School of Dentistry
Western Reserve University
2165 Adelbert Road
Cleveland 6
Dean, Paul E. Boyle

Oregon

University of Oregon Dental School
611 S. W. Campus Drive
Sam Jackson Park
Portland
Dean, Harold J. Noyes

Pennsylvania

School of Dentistry
Temple University
3223 North Broad Street
Philadelphia 40
Dean, Gerald D. Timmons

Thomas W. Evans Museum and
Dental Institute School of Dentistry
University of Pennsylvania
4001 Spruce Street
Philadelphia 4
Dean, Lester W. Burket

School of Dentistry
University of Pittsburgh
Thackeray and O'Hara Streets
Pittsburgh 13
Dean, William F. Swanson

Tennessee

School of Dentistry
Meharry Medical College
Nashville 8
Dean, William H. Allen

*College of Dentistry
University of Tennessee
847 Monroe Avenue
Memphis 3
Dean, James T. Ginn

Texas

College of Dentistry
Baylor University
800 Hall Street
Dallas 10
Dean, Harry B. McCarthy

University of Texas Dental Branch
6516 John Freeman Avenue
Houston 25
Dean, John V. Olson

Virginia

School of Dentistry
Medical College of Virginia
Wood Memorial Building
Richmond 19
Dean, Harry Lyons

Washington

School of Dentistry
University of Washington
Health Sciences Building
Seattle 5
Dean, Maurice J. Hickey

West Virginia

**School of Dentistry
West Virginia University
Morgantown
Dean, Kenneth V. Randolph
(First freshman class enrolled
in the Fall of 1957)

Wisconsin

School of Dentistry
Marquette University
604 North Sixteenth Street
Milwaukee 3
Dean, O. M. Dresen

Puerto Rico

**School of Dentistry
University of Puerto Rico
San Juan
Dean, A. Raymond Baralt
(First freshman class enrolled
in the Fall of 1957)

Canada

Faculty of Dentistry
University of Alberta
Medical Building
Edmonton, Alberta
Dean, Hector R. MacLean

Faculty of Dentistry
Dalhousie University
Halifax, Nova Scotia
Dean, James D. McLean

Faculty of Dentistry
University of Toronto
230 College Street
Toronto 2B, Ontario
Dean, Roy G. Ellis

Faculty of Dentistry
McGill University
Montreal, P.Q.
Dean, James McCutcheon

Faculty of Dental Surgery
Universite de Montreal
2900 Boulevard du Mont-Royal
Montreal, P.Q.
Dean, Paul Geoffrion

BUREAU OF PUBLIC INFORMATION

100 years: a report on four centennials

Four dental societies have now marked their 100th year of existence. As other dental societies in many parts of the country approach the century mark, and as the American Dental Association itself moves closer to its centennial year, this report on centennial activities is presented with a two-fold purpose. It is intended (1) as a possible guide for societies interested in special observances for their own centennials, and (2) as a source for ideas for societies in cooperating in the nationwide program in 1959 to mark the founding of the American Dental Association.

Two state dental societies and a local dental society—those of North Carolina, Michigan and St. Louis—reached the 100-year milestone in 1956 and one, Indiana, reached it in 1958. Each arranged for special programs. Each observance had points in common and each had unique features. All the societies, however, appeared to plan for the occasion with two objectives in mind: (1) to renew the profession's sense of its own meaningful purpose and (2) to make an impact on the public in terms both of the significant progress made by the profession and the importance of dental health.

All four societies emphasized the necessity for careful and adequate financing and the importance of early planning for the occasion. All issued special centennial seals or stickers or both. All enlisted the services of their women's auxiliary. The efforts of all four societies were climaxed with special activities arranged for their annual meetings.

For the North Carolina Dental Society, an aspect of the observance was the establishment of three enduring monuments of the occasion. A highway marker was erected in Raleigh's Capital Square to commemorate the first formal meeting of the society. The inscription states: "The North Carolina Dental Society was organized October 16, 1856, in the Guion Hotel which stood near this site. Dr. William F. Bason, President." The marker was erected by the North Carolina Historical Sites Commission through the efforts of the society's centennial committee.

Additionally, portraits of three of the founders of the society were commissioned and presented to the North Carolina Department of Archives and History for permanent showing with other state leaders in the Hall of History in Raleigh. The centennial committee enlisted the cooperation of the state Department of Archives and History in this project, and for another effort, a permanent exhibit depicting the history of dentistry in North Carolina, to be placed in the State Museum in Raleigh.

As a forerunner to the annual meeting, some 200,000 centennial seals with the theme, "The past is just the beginning," were mailed to all members of the society, to dental supply houses and to dental laboratories in the state. At the meeting itself, commemorative coins with the same slogan were distributed. As a part of the event, the North Carolina Dental Auxiliary made arrangements with business firms for special window displays in 26 communities throughout the state.

The society's activities culminated in the annual meeting which took place May 13-16 at the Carolina Hotel in Pinehurst.

In addition to an unusually extensive scientific program, the meeting included social events and business sessions that emphasized organized dentistry's history.

The flavor of the 1850-60 era was evoked at several social functions. On the opening Sunday, many guests arrived in antibellum fashions at a lawn party given by the North Carolina Dental Auxiliary for members of the dental society. A string orchestra played melodies of the 1850's while such equipages as a surrey and landau were available for drives. On Tuesday evening, the dental society held its annual banquet which was followed by a centennial costume ball. There was a grand march with awards for the best fashions of 1856.

On the more serious side, Sunday evening was devoted to ceremonies for the unveiling of portraits of the society's founders and their formal presentation to the state archives and history director. The program was climaxed by an address, "A Century of Progress," given by William N. Hodgkin, of Warrenton, Va., a past president of the American College of Dentists. Similarly, on Monday afternoon, two more historical addresses were made. Lon W. Morrey, of Chicago, editor of the American Dental Association, spoke on "100 Years of Dental Service," and Darden J. Eure, of Morehead City, N. C., on "Opportunities and Obligations Ahead." Throughout the annual session, there was a display of dental historical exhibits which had been obtained from the School of Dentistry, Emory University; the School of Dentistry, University of Maryland, and the S. S. White Dental Manufacturing Co.

For the centennial of the Michigan State Dental Association, events were concentrated largely on the annual meeting. As a prelude to the meeting in April, the February *Journal of the Michigan State Dental Association*, largest ever published by the society, was designated as the centennial issue and contained five articles on various historic developments in dentistry in Michigan. The theme of the observance was: "The achievements of yesterday but increase the challenge of tomorrow."

The meeting itself was extended to four days instead of the usual three, from April 16 through 19, at the Hotel Statler in Detroit, to provide for an official centennial program in addition to the usual social and scientific events. Officials of a number of fields outside of dentistry had been invited and among those present were leaders in law, medicine, government, education, hospital administration, pharmacy and many segments of industry. Additionally, invitations had been extended to all state societies. Representatives of some 30 constituent societies throughout the United States were in attendance as well as officials of the American Dental Association. Highlight of the program was a centennial banquet Wednesday evening, the third evening of the meeting, at which nine centennial awards were conferred for outstanding contributions to dentistry on the Secretary of the Army, a former senator, four dentists, an automobile industry official and an executive of a foundation. A posthumous award was presented to a fifth member of the dental profession. Additionally, there were centennial citations to executives of a dental manufacturing company and of a dental supply company, and an honorary membership to a Canadian dental executive. The award ceremonies were followed by an elaborate pageant, "Footlights on a Century," which dramatized episodes in the society's history. The pageant was written and produced by a theatrical director and included a cast both of professional actors and members of the dental society.

The centennial program also included a series of addresses on Tuesday. Harold Hillenbrand, secretary of the American Dental Association, gave an opening "Salute to the Centennial." At a centennial luncheon the same day, Marcus L.

Ward, past president of the Association and dean emeritus of the School of Dentistry, University of Michigan, spoke on "Highlights in the Development of Dentistry in Michigan"; Bernerd C. Kingsbury, then president of the Association, talked on "The Dental Story," and John W. Knutson, of Washington, chief of the dental division of the U. S. Public Health Service, discussed "Sign Posts of Advances in Dental Health." As part of the annual meeting, there were three historical exhibits, two at the Statler Hotel and one in a display window of the Detroit Historical Museum. Much of the material was supplied by the Warshaw Collection of New York, the Henry Ford Museum, the University of Detroit and the Chrysler Corporation.

The Indiana State Dental Association, as a feature of its centennial observance, issued a comprehensive memorial booklet that was distributed widely in conjunction with the society's four-day centennial meeting in Indianapolis in mid-May 1958. The booklet contained, in addition to a digest of the program for the meeting, a number of informative articles on various historical aspects of dentistry, each prepared by an authority in the field. These included articles on Indiana dentistry prior to 1858, on the history of organized dentistry in Indiana, on the history of dental education in Indiana, on the history of the dental practice act in Indiana and on dental public health in Indiana. Additionally, there were three brief guest articles: "Who are the Pioneers?" by W. R. Allstadt, president of the American Dental Association; "A Glimpse at the Second Century" by Dr. Hillenbrand, and "Salute to the Indiana State Dental Association" by Surgeon General L. E. Burney of the U. S. Public Health Service.

At the meeting as special guests were deans of a number of dental schools together with American Dental Association representatives, officials of allied health groups and government leaders. Centennial awards were presented to 12 members of the dental profession, the board chairman of a pharmaceutical company and the Public Health Service Surgeon General.

The chief social events at the meeting were a centennial reception and dance on one evening and a president's banquet the next night. The theme of the session was "100 Years of Progress," a slogan used on a seal issued for the observance. The lobby of the Claypool Hotel, site of the meeting, contained a display of a modern dental office and one of 100 years ago.

Most extensive of the observances of the four societies was that of the St. Louis Dental Society which carried on a yearlong program. "I would urge any society planning such a program to start at least two years in advance of the celebration," an official of the society said. As part of the planning, a letter and a questionnaire were sent to all 885 members who were asked to check blanks in the form relating to the purpose of the observance, projects and financing, and to add other ideas. Replies were received from 200 members. Additionally, interviews were conducted with school officials, public health administrators and others on the possibility of tie-ins. The society's centennial committee engaged a professional public relations agency to assist in the development of a detailed suggested program.

As to financing, the society obtained support in good part by soliciting contributions, from members and those in allied fields, to the Centennial Anniversary Celebration Fund. Certificates were issued to these "Centennial Sponsors."

With the theme, "A Second Century Begins—Better Health Through Dentistry," which appeared on the seal issued by the society, the year's observance was built around four principal events and programs.

The opening phase of the program—for January, February and March—

emphasized dental health education for children and their parents. As part of Children's Dental Health Week, a "Smiles of Health Contest" was launched in the elementary and high schools. A colorful poster announcing the contest was sent to all classrooms in the area. Winners were announced and presented at the society's Mid-Continent Dental Congress in November. The kick-off event was a dinner meeting January 9 at which the speaker was Dr. Hillenbrand. In conjunction with the opening of the observance, the *St. Louis Globe-Democrat* issued a special Sunday magazine supplement devoted to the centennial.

"Dentistry as a Profession" was the theme of the second portion of the observance, in April, May and June, which was initiated with a dinner meeting April 25 at the farm of a prominent industrialist. Gerald D. Timmons, dean of the School of Dentistry, Temple University, was the principal speaker. This second period was devoted largely to dental career discussions at school assemblies, forums and other youth gatherings, and to publicizing the advantages of dentistry as an occupation.

The third phase of the observance, for August, September and October, was centered on the Mid-American Jubilee, a 30-day event held on the Mississippi riverfront, beginning in September, under the sponsorship of the St. Louis Metropolitan Chamber of Commerce and numerous other civic groups. The St. Louis Dental Society prepared a display booth that was seen by an estimated 400,000 persons. The society distributed many thousands of copies of a leaflet that combined a brief history of organized dentistry with a description of what modern dentistry offers.

The Centennial Mid-Continent Dental Congress, winding up the year's observance, took place November 25-28. Among special guests were presidents of a number of state dental societies, officials of the American Dental Association and numerous civic and government officials and officers of allied health groups. Centennial awards were presented to five dental leaders and three dental schools. There were two social events, including a centennial dance the opening Sunday evening and a centennial banquet on Tuesday at which the awards were presented.

Note: Should additional information be desired about any aspect of these four centennial observances, it can be obtained from the following: Mr. Andrew M. Cunningham, executive secretary, North Carolina Dental Society, P.O. Box 11065, Raleigh, N. C.; Mr. H. Leon Snow, executive secretary, Michigan State Dental Association, 112 E. Allegan, Lansing 68, Mich.; Mr. Broderick H. Johnson, executive secretary, Indiana State Dental Association, Hume Mansur Bldg., Indianapolis 4, Ind., and Mr. James E. Brophy, executive secretary, St. Louis Dental Society, 8013 Maryland Ave., St. Louis 5, Mo.

BUREAU OF ECONOMIC RESEARCH AND STATISTICS

The ILWU-PMA dental program: first-year statistics. 1. Introduction

In 1954 the Welfare Fund jointly administered by the International Longshoremen's and Warehousemen's Union and the Pacific Maritime Association (employers) found itself with funds available to expand its program of health benefits for employees and their families. Of several possible programs, it was decided that a program of dental care be instituted, at least for a trial period of one year, for the children of beneficiaries of the ILWU-PMA Welfare Fund.

Members of the ILWU live and work along the West Coast, mainly in the major cities but also scattered somewhat among smaller towns. Trustees of the Welfare Fund were faced with the problem of designing a dental program that would make dental service conveniently available to all, be efficiently administrable and provide service in accord with standards of the dental profession. In most respects there was no precedent for the program desired. With the cooperation of state dental associations of the West Coast, such a program was designed and put into operation in the fall of 1954.

The program has attracted the interest of several agencies which have studied and reported on its various aspects. In general, the program is considered to be popular and successful, and the "one-year pilot program" has been extended into what appears to be a permanent program.

The purpose of this study is to analyze the actuarial aspects of the pilot year of the program. It is believed that such an analysis will be helpful to other organized groups and dental associations which in the future will be faced with the problem of establishing programs for the group purchase of dental care.

Of the approximately 11,000 chldren eligible, during the first year 7,822 children between the ages of 1 and 14 received dental care paid for under the program. Of this number, 35 received emergency care only. A total of 7,787 received "initial" care, that is, received an initial episode of treatment under the program. There were 2,499 recall episodes of treatment. (A few patients more than 14 years of age received care under the program but are excluded from the statistics in this study.)

Table 1 shows the age and sex distribution of patients receiving care during the pilot year. Age as of last birthday was recorded at the beginning of treatment. Mean age was 8.5 years for children receiving initial care, 8.2 for those receiving recall care and 8.9 for those receiving emergency care.

Unfortunately, little statistical information is available on the race of the patients receiving treatment. In only one plan, the Wilmington service plan, was nearly complete information on race recorded. In that plan, 90 per cent of the patients were white and 10 per cent nonwhite. It is known that there were no Negro patients in the Oregon plans, and that a large proportion of the patients in the San Francisco service plan were Negroes.

The dental program was divided into nine plans. The number of children ages 1 through 14 receiving care under each plan is shown in Table 2. Certain differences in the organization and provisions of the various plans are important in interpreting the statistics on dental serv-

Table 1 • Distribution of patients receiving care, by age and sex

Age	Initial care			Recall care			Emergency care		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
1	49	34	83	8	9	17	0	0	0
2	133	106	239	50	46	96	1	1	2
3	200	207	407	71	84	155	1	0	1
4	264	243	507	84	92	176	3	2	5
5	285	293	578	98	108	206	0	3	3
6	325	328	653	110	108	218	2	2	4
7	328	353	681	90	128	218	3	1	4
8	365	321	686	122	104	226	4	2	6
9	324	299	623	95	91	186	4	2	6
10	327	339	666	114	117	231	4	1	5
11	345	345	690	111	121	232	3	7	10
12	354	369	723	118	124	242	1	4	5
13	331	289	620	108	87	195	3	2	5
14	326	305	631	56	45	101	1	2	3
All ages	3,956	3,831	7,787	1,235	1,264	2,499	30	29	59

ices that were provided the children.

Under the five "insured" plans, an insurance company acted as claims agent and made payments to dentists. The patient was permitted to obtain care from any dentist who was a member of the American Dental Association or eligible for membership. The important characteristic of the insured plans from the standpoint of this study is that there was a monetary limit on the amount of care any child could receive during a year under the program. This limit varied somewhat among the plans: for the California insured plans it was $75; for Oregon and Washington it was $95.

There was no dollar limit for the individual patient under the four service plans. The service plans were of two types. In San Francisco and Wilmington the Welfare Fund contracted with established dental clinics to provide care. In Oregon and Washington dental service corporations were established by the state dental societies to handle payment to dentists. A large proportion of the members of these two state dental societies participated in the program. The patient, therefore, was not required to travel to a certain clinic but in most instances could receive care under the program from a dentist near by.

The statistics on dental treatment rendered under the service plans will

Table 2 • Number of patients receiving care in each plan

Plan	Initial care	Recall care	Emergency care
San Francisco Service Plan	1,352	301	12
San Francisco Insured Plan	948	157	9
Wilmington Service Plan	1,586	600	0
Wilmington Insured Plan	688	185	8
Oregon Service Plan	1,192	526	1
Oregon Insured Plan	11	5	0
Washington Service Plan	1,480	649	23
Washington Insured Plan	80	15	0
California Small Ports Insured Plan	450	61	6
Total	7,787	2,499	59

represent nearly complete dental needs except for the services specifically excluded. For the insurance plans, with their monetary limits on amount of service allowable, the statistics will represent complete needs for some but not all patients.

Orthodontics, care for solely cosmetic reasons, and dental care already covered under the Welfare Fund's health program were excluded from all the dental plans. In Oregon and Washington, bridgework and space maintainers were also excluded.

The data for this study were made available through the cooperation of the ILWU-PMA Welfare Fund, which collected the examination and treatment records from the nine plans and recorded the data in punch cards. The American Dental Association participated in the planning of data collection and in financing the machine recording of the data.

Subsequent chapters of this study will present statistics on dental services provided under the program, with analysis according to age, plan and length of time since last visit to a dentist. Certain services will be analyzed by tooth number. One chapter will be devoted to the cost of services rendered.

COUNCIL ON FEDERAL DENTAL SERVICES

Dependents' Medical Care Act: remote areas

Two years have passed since the enactment of the Dependents' Medical Care Act (Public Law 569—84th Congress), commonly referred to as the Medicare Act. This law provided statutory authority for the establishment of "an improved and uniform program" of health care for certain dependents of members of the uniformed services. The provision of dental services to dependents was treated in two facets: (1) in the facilities of the uniformed services and (2) in civilian facilities. This report deals only with the first enumerated facet.

The Medicare Act prohibits the rendition of routine dental care to the dependents of military personnel in facilities of the uniformed services within the continental United States except in remote areas in which adequate civilian dental services are not available. This remote area concept is in full accord with the Policy Statement on Military Dependent Care[1] adopted by the House of Delegates of the American Dental Association in 1954.

Immediately after the enactment of the Medicare legislation, a directive was issued under the joint authorship of the Department of Defense and the Department of Health, Education, and Welfare. This directive was intended to establish the guidelines for the implementation of the law. In the directive, certain criteria were delineated which identified the type of statistical data that should be submitted by the military authorities requesting the designation of a particular military installation as remote for dependent dental care purposes. These data, illustrative of the availability of civilian dental services within a prescribed radius of the installation, when measured against the criteria, would determine the justification for approving

1. Transactions of the American Dental Association 1954, p. 76.

remote designation. In order to avoid controversy as much as possible, the military authorities were also subsequently instructed that any request for remote status must be accompanied by a statement of the opinion of the appropriate state dental society with respect to the justification of such a status.

In the period that has elapsed since the promulgation of the implementing directive and regulations described, 98 requests for remote designation have been received by the Department of Defense. Of this number, 71 have been approved, 13 disapproved and 14 are pending or have been returned as incomplete. Forty-nine of the requests that have been approved received the endorsement of the state dental society concerned; 22 were approved over the objection of the state society. The following table identifies all of the installations with respect to which a request for remote designation was received by the Defense Department, the position of the state dental society, and the final disposition.

State	Installation	Position of state society	Department of Defense Action and Date
Alabama	Fort McClellan	Opposed	Approved —3/4/58
	Redstone Arsenal	Favored	Approved —7/2/57
	Fort Rucker	Opposed	Approved —2/24/58
Arizona	Fort Huachuca	Opposed	Approved —9/16/57
	Yuma Test Station	Favored	Approved —10/30/57
Arkansas	Fort Chaffee	Opposed	Disapproved—3/25/58
California	Edwards AFB	Favored	Approved —12/4/57
	George AFB	Opposed	Disapproved—3/25/58
	Camp Irwin	Favored	Approved —7/25/57
	Klamath AFS	Favored	Approved —3/11/58
	Marine Corps Cold Weather Training Center	Favored	Approved —5/20/58
	Mount Laguna AFS	Favored	Approved —3/11/58
	Point Arena AFS	Favored	Approved —3/11/58
	Sierra Ordnance Depot	Favored	Approved —10/21/57
	U.S. Disciplinary Barracks, Lompoc	Favored	Approved —5/3/57
	U.S. Marine Corps Auxiliary Air Station, Mojave	Favored	Approved —3/24/58
Delaware	Dover AFB	Favored	Approved —8/21/57
District of Columbia	Walter Reed Army Medical Center	Not solicited	Returned w/o action —5/2/57
Florida	Eglin AFB	No objection (now opposed)	Approved —8/21/57
	Patrick AFB	Favored	Approved —8/21/57
Georgia	Fort Benning	No objection	Approved —4/25/58
	Fort Gordon	No objection	Approved —4/25/58
	Fort McPherson	Not solicited	Returned w/o action —5/2/57
	Fort Stewart	Favored	Approved —12/11/57
	Turner AFB	Opposed	Disapproved—8/21/57
Idaho	Mountain Home AFB	Opposed	Approved —1/7/58
Indiana	Fort Benjamin Harrison	Favored	Approved —8/27/57
Kansas	Fort Leavenworth	Favored	Approved —7/3/57
	Fort Riley	Favored	Approved —7/15/57
Kentucky	Fort Knox	Opposed	Disapproved—8/22/57 Approved —1/17/58

(Continued)

State	Installation	Position of state society	Department of Defense Action and Date
	Fort Campbell	Opposed	Disapproved—6/4/58
Louisiana	England AFB	Opposed	Disapproved—8/21/57
	Fort Polk	Opposed	Approved —2/5/58
Maine	Loring AFB	Favored	Approved —8/21/57
	U.S. Naval Radio Station, Winter Harbor	Favored	Approved —10/11/57
Maryland	Aberdeen Proving Ground	Favored	Approved —10/21/57
	Army Chemical Center	Favored	Approved —10/21/57
	Fort Holabird	Favored	Approved —11/7/57
	Fort George G. Meade	Favored	Approved —11/13/57
	Fort Ritchie	Favored	Approved —10/11/57
Massachusetts	Fort Devens	Favored	Approved —12/13/57
Michigan	Camp Lucas	Favored	Approved —3/14/58
Minnesota	Finland AFS	Opposed	Approved —11/25/57
	Wadena AFS	Opposed	Disapproved—11/25/57
Missouri	Fort Leonard Wood	Opposed	Approved —2/5/58
Montana	Cut Bank AFS	Favored	Approved —11/19/57
	Havre AFS	Favored	Approved —11/19/57
	Opheim AFS	Favored	Approved —11/19/57
Nevada	Indian Springs AFB	Favored	Approved —11/19/57
	Nellis AFB	Favored	Approved —8/21/57
	U.S. Naval Ammunition Depot, Hawthorne	Favored	Approved —8/21/57
	Winnemucca AFS	Favored	Approved —5/16/58
New Jersey	McGuire AFB	Opposed	Disapproved—11/25/57
New Mexico	Continental Divide AFB	Favored	Approved —11/25/57
	Holloman AFB	Opposed	Approved —4/9/58
	Red Canyon Range Camp	Favored	Approved —3/14/58
	Sandia Base	Not solicited	Returned w/o action —5/2/57
	Tierra Amerilla AFS	Favored	Approved —11/19/57
	Walker AFB	Opposed	Disapproved—11/25/57
	White Sands Proving Ground	Opposed	Approved —12/13/57
New York	Fort Niagara	Not solicited	Returned w/o action —5/2/57
	U.S. Military Academy	Not solicited	Returned w/o action —3/27/57
North Carolina	Fort Bragg	Conditionally favored	Approved —12/11/57
	Pope AFB	Conditional favor assumed	Approved —3/11/58
	Seymour Johnson AFB	Conditionally favored	Approved —3/24/58
North Dakota	Fortuna AFS	Favored	Approved —11/19/57
Oklahoma	Ardmore AFB	Opposed	Approved —11/25/57
	Fort Sill	Opposed	Approved —3/28/58
Pennsylvania	New Cumberland General Depot	Opposed	Disapproved—3/4/58
South Carolina	Fort Jackson	Conditionally favored	Approved —1/13/58
	Marine Corps Recruit Depot, Parris Island	Conditionally favored	Approved —11/19/57
	Shaw AFB	Opposed	Approved —4/24/58

(Continued)

State	Installation	Position of state society	Department of Defense Action and Date
Texas	Fort Bliss	Opposed	Disapproved—11/15/57
	William Beaumont Army Hospital	Not solicited	Returned w/o action —5/2/57
	Brooke Army Medical Center	Not solicited	Returned w/o action —5/2/57
	Camp Gary	Opposed	Approved —11/12/57
	Fort Sam Houston	Not solicited	Returned w/o action —5/2/57
	Fort Hood	Opposed	Disapproved—3/24/58
	Lackland AFB	Not solicited	Returned w/o action —3/27/57
	Laredo AFB	Not solicited	Returned w/o action —3/27/57
	Laughlin AFB	Opposed	Disapproved—3/24/58
	Sheppard AFB	Not solicited	Returned w/o action —3/27/57
	Camp Wolters	Opposed	Approved —7/2/57
Utah	Dugway Proving Ground	Favored	Approved —7/2/57
	Tooele Ordnance Depot	Favored	Approved —7/3/57
	Wendover AFB	Favored	Approved —8/21/57
Virginia	Fort Belvoir	Not solicited	Returned w/o action —5/2/57
	Fort Eustis	Opposed	Approved —1/14/58
	Camp A. P. Hill	Opposed	Approved —2/5/58
	Langley AFB	Opposed	Approved —3/11/58
	Fort Lee	Opposed	Approved —8/12/57
	Fort Monroe	Opposed	Pending —6/6/58
	Fort Story	Opposed	Disapproved—1/20/58
	U.S. Naval Schools Mine Warfare	Opposed	Approved —3/11/58
	Vint Hill Farms Station	Opposed	Approved —7/25/57
Washington	Curlew AFS	Favored	Approved —5/16/58
	Camp Hanford	Favored	Approved —6/7/57
	Francis E. Warren AFB	Not solicited	Returned w/o action —3/27/57

An awareness of the difficulties inherent in the management of a program of this type prompted the Council on Federal Dental Services, at its April 1958 meeting, to adopt and transmit to the Department of Defense a recommendation that the Dental Advisory Committee to the Department of Defense be empowered to consider all requests for remote area designation with respect to which a controversy exists between the military authorities seeking the designation and the state dental society concerned. The Council has been informed by Dr. Frank B. Berry, Assistant Secretary of Defense (Health and Medical), that the Council's recommendation will be followed in all cases in which there is serious disagreement between the two interested groups. Routine requests will continue to be handled by Dr. Berry's office. While awaiting developments under this new system of evaluation, the Council will continue to analyze all aspects of the matter of the provision of dental care to the dependents of military personnel as it bears upon the interests of the dental profession.

Book Reviews

THE DENTAL SERVICES CORPORATION: A NEW APPROACH TO DENTAL CARE

By the Public Health Service, U. S. Department of Health, Education and Welfare. Sponsored by the Washington State Dental Service Corporation and Division of Dental Resources. 70 pages with 2 tables. Index. Washington, D. C., U. S. Government Printing Office, 1958.

This exceptionally well-prepared pamphlet describes the history and organization of the Washington State Dental Service Corporation and is its answer to a request from the International Longshoremen's and Warehousemen's Union-Pacific Maritime Association to provide a dental care program for children as a fringe benefit administered under the ILWU-PMA Welfare Plan.

Part II, "Planning a Dental Service Corporation," will be a guide of great assistance to any dental society that may be approached to negotiate a group dental care program using a fee schedule and services to be included or excluded.

Furthermore, the appendix gives much valuable information with exhibits of agreement, articles of incorporation, records, and fee schedule.

This pamphlet gives an excellent foundation for the forming and administering of a dental service corporation by a dental association.

Charles A. Sweet

ORAL SURGERY DIRECTORY OF THE WORLD

W. Harry Archer, editor-in-chief. 298 pages. Index. $6.50. Pittsburgh, Oral Surgery Directory of the World, 1957.

This work, prepared with considerable international cooperation, is the first endeavor to compile a directory of oral surgeons throughout the world. Not limited to a mere listing of names, this book, in its 12 chapters, provides general, historical and other information on the following topics: (1) American Board of Oral Surgery; (2) American Society of Oral Surgeons; (3) regional oral surgery societies in the United States and Canada; (4) oral surgeons in the Armed Forces, Veterans Administration, and U. S. Public Health Service; (5) dental schools and their faculties in the United States and Canada; (6) graduate and postgraduate courses in dentistry; (7) hospital dental internships and residencies, (8) biographical data on oral surgeons in the United States and Canada; (9) abstracts of state specialty laws, and (10) oral surgeons in foreign countries. A limited alphabetical index, listing only the names of oral surgeons whose biographical data is included in this volume, closes the compilation.

Despite the title, this directory is preponderantly North American. The section devoted to oral surgeons in foreign countries is completely lacking in the general information provided for American parts of this directory. Furthermore, the listing, for the most part, is limited to faculty members of foreign dental schools. To improve this section is a challenge for future editions of this book.

One may be critical of details, but cannot fail to be impressed by the amount of information incorporated in this volume. Excellently printed and bound, this directory will be useful to all persons interested in the specialty of oral surgery. It will be an especially valuable addition to reference collections of dental and medical school libraries.

J. Cedrins

PERIODONTIA

By Henry M. Goldman, D.M.D., and D. Walter Cohen, D.D.S. Fourth edition. 535 pages with 366 illustrations. Index. $12.50. St. Louis, C. V. Mosby Co., 1957.

This book offers an excellent coverage of the periodontal diseases in terms of their causation, their recognition by thorough examination, and their definitive diagnosis. It has much to recommend it as a dental student text and as a source of basic periodontal material of value for the dentist in practice. The treatment of periodontal diseases has been surveyed by Goldman and co-authors in a recent companion volume entitled *Periodontal Therapy* (Goldman, Schluger and Fox) and is therefore excluded.

There are numerous features of *Periodontia* which give it the stamp of quality. Technically, with the exception of its prints of intraoral photographs, it is an excellent product—not too large, well-bound, and printed in clear type. As a result, such chapters as those entitled "Oral Physiology," "Periodontal Pocket," and "Etiology" are particularly helpful in giving the reader a basis for treatment planning. The systematic approach to examination and

diagnosis is refreshing. Roentgenographic interpretation, for example, is given a new and deserving emphasis. Occlusal traumatism is covered thoroughly and in a manner reflecting the current majority opinion as to its place in the development of periodontal disease.

Goldman and Cohen have produced a sound basic text in periodontology. Their volume deserves, and will receive, wide distribution and careful study.

Alfred L. Ogilvie

CLINICAL APPLICATIONS OF HYPNOSIS IN DENTISTRY

By S. Irwin Shaw, D.M.D., M.Ed. 173 pages with 25 illustrations. Index. $4.50. Philadelphia, W. B. Saunders Co., 1958.

This compact volume offers an authoritative description of fundamental hypnotic induction technics applicable to dentistry. Extreme conciseness and devotion to this one aspect of hypnosis will limit the use of the book. The experienced hypnotist should find it valuable as a reference manual for review of technic. The beginner will find it useful only if he integrates the dental application into his broader study of hypnosis. To this end, a brief but adequate bibliography is included.

Dr. Shaw rightly has placed great emphasis on the dentist's limitations in the application of hypnosis. On the other hand, he has presented a clear-cut picture of suggestion as it influences normal behavior patterns. It is especially gratifying to find that the author regards the effects of sincerity, warmth and consideration on the part of the dentist as paramount factors in patient management, and reserves the application of hypnosis proper only to the extremely apprehensive and difficult dental patient.

Wilbur O. Ramsey

THE PHYSICIAN'S OWN LIBRARY; ITS DEVELOPMENT, CARE AND USE

By Mary Louise Marshall. 87 pages. Index. $3. Springfield, Ill., Charles C Thomas, 1957.

Socrates has the first word in this fact-filled book: "Employ your time in improving yourself by other men's documents. So shall you come easily by what others have labored hard for." By placing this quotation above the title of the first chapter, "Libraries and the Physician," the author without delay provides the reader with the basic reason for developing his own library. The author, one of the most competent and widely-known of medical librarians, has written this book after 43 years of library experience. Thirty-seven of them were spent working directly with physicians and medical students in medical libraries and in teaching medical bibliography in Tulane University Medical School. In 83 pages she discusses briskly and clearly the physician and his library; plans for a personal library (if to date your library "just grew" it is time to make a plan); budgeting; selecting, ordering and checking books and journals; arrangement and physical care of books and journals; library records; case records in the library, and the use the physician should make of his own library.

Since plans for present day personal libraries do not generally presuppose an extensive collection, supplementary services such as book loan and photoduplication services and plans for the cooperative organization of a small medical library are also discussed.

Two chapters on "The Medical Paper" and "Preparing and Index" are an added bonus. The reader is offered wider scope through the inclusion of references for further reading at the end of various chapters.

While Miss Marshall has written this book expressly for her friend the physician, its adaptableness to use by the dentist would probably cause her no surprise. For the most part this can be done rather simply through the substitution of dental titles for medical titles. The dentist who has been pondering the development of a personal library will find this book enlightening. The dentist who has been assiduously or desultorily collecting a personal library will find it a good check on his progress.

Donald Washburn

MODERN DRUG ENCYCLOPEDIA AND THERAPEUTIC INDEX

Edited by Edwin P. Jordan, M.D. Seventh edition. 1,516 pages. Indexes. $17.50. New York, Drug Publications, Inc., 1958.

This reference work is revised every few years. It contains descriptions of many trademarked drugs and of a few which are not designated by brand names. The information is supplied by the distributors of the drugs. Each purchaser of the book automatically receives a small supplement called *Modern Drugs* every two months. The supplement contains descriptions of new drugs.

Each description includes the commercial source, the generic name, the chemical nature, actions and uses, dosage, available dosage

forms, precautions, and sizes of trade packages. The narcotic drugs are designated by the code letters A, B and X, to indicate that they are (A) under full control, (B) may be prescribed orally or (X) are exempt. Prescription drugs are indicated by the code designation "Ps."

The emphasis on brand names detracts slightly from the otherwise clear and dignified presentation of reliable information. This will perhaps be unavoidable as long as the editor depends on the distributors of the listed drugs for the descriptions. The generic name index is near the so-called "General Index," but is hard to find. The "General Index" lists some generic names, but the cross-indexing is inadequate. Many drugs more important to dentists than to physicians, and some very widely used medical preparations, are not listed. Physically, the book is of high quality. It is competently edited.

Modern Drug Encyclopedia is most useful for two purposes. It provides a quick means of finding the generic name and commercial source for old and new drugs when one knows only the trademark name. It also furnishes therapeutic information about many drugs which are still too new to be described in textbooks.

Donald A. Wallace

ACCEPTED DENTAL REMEDIES 1958

American Dental Association Council on Dental Therapeutics. Twenty-third edition. 228 pages. Index. $2. Chicago, American Dental Association, 1958.

Accepted Dental Remedies (ADR) is published annually. It contains information concerning drugs, devices and related therapeutic items and their actions, uses, and limitations. Brand names and statements of composition for products which conform with the provisions of the Council on Dental Therapeutics of the American Dental Association are included.

This edition of ADR represents a more comprehensive revision than usual.

The table of contents has been expanded to include useful detail under the chapter headings. The first three chapters contain much new material. They cover dental consideration of the patient receiving medical care, emergencies in the dental office, and prescription writing. The chapters on instrument disinfection, antibiotics, local anesthetics and analgesics have been re-edited and enlarged to include evaluations of many new drugs and devices.

Throughout the book, the chemical descriptions and structural formulas have been improved. Trade names are placed in close proximity to related generic names, thus helping to clarify nomenclature. The type is new, and there are slightly fewer words per page. The net effect is to make the book more readable as well as more attractive in appearance.

The information in ADR is conservative, highly reliable and timely. Every dentist and dental student should have the current edition.

Donald A. Wallace

DENTAL SURVEY OF STATE SCHOOL CHILDREN IN NEW SOUTH WALES JANUARY 1954 - JUNE 1955

By P. D. Barnard, B.D.S. 69 pages. Index. Canberra, Australia, A. J. Arthur, Commonwealth Government Printer, 1956.

This report presents the results of a survey of 6,787 state school children (aged 6 to 15) in New South Wales. Dentists using mouth mirrors, probes and roentgenograms provided data relevant to the following:

1. Prevalence of dental caries according to age, sex, race and environment.
2. Relation between the results of roentgenographic and clinical methods of examination.
3. Eruption of the permanent teeth.
4. Dental treatment previously received and treatment necessary at the time of examination.
5. State of oral hygiene.
6. Condition of the gingivae.
7. Prevalence of malocclusion.
8. Prevalence of other abnormalities.
9. Prevalence of hypoplastic and hypocalcified teeth.
10. Condition observed in special groups of children.
11. Fluoride content of drinking water used in many of the areas visited.

Some of the observations are particularly significant to those who have conducted studies in the United States. Among the children examined, only 1.5 per cent of the children were caries-free. The mean DMF rate among 6 year old children was .99 and 2.31 among 7 year old children.

The six year old children showed a $\frac{F \times 100}{DMF}$ rate of 9.5 whereas the 15 year old children had a rate of 52.1. Only one child with a cleft palate was encountered. Three children showed evidence of a cleft lip.

The author concludes that his observations clearly indicate the need for:

1. More intensive health education of child and parent, including instruction in nutrition and dietetic habits.

2. Greater facilities for treatment.
3. Institution of the practice of fluoridation.
4. Research.

The materials and methods used are described minutely. Results have been tabulated in detail and a number of informative graphs have been included.

Discussions, summaries and the conclusions of the surveyor complete this thoroughly prepared report.

J. M. Wisan

AS IT WAAS

By Milton J. Waas. 125 pages. $2.50. Philadelphia, Dorrance & Company, Inc., 1957.

To begin with, the author was endowed with a perfect surname to be used in the title of an autobiography. For in this little volume, Dr. Waas has tried to tell how it was in his sphere of activity and influence during his lifetime. A note at the beginning of the book tells of the mythical conception of the Phililulu bird (whose picture is used throughout the text). It is said that this bird has a decided preference for the past rather than the future. (Symbol of autobiographers?)

Dr. Waas discusses events throughout his life from early childhood. A section on the time he spent as an assistant to a famous dentist in Germany prior to World War I is filled with a description of life there. He goes further to tell of his experiences in private practice and some of the well-known people who were his patients and of his work as a public health dentist in Pennsylvania.

Anyone interested in human nature might find the book enjoyable for, although not brilliant, the style is adequate. The technical aspects of the book are certainly acceptable.

Theodore C. Levitas

DIE ZAHN-, MUND- UND KIEFERHEILKUNDE: EIN HANDBUCH FÜR DIE ZAHNÄRZTLICHE PRAXIS (THERAPY OF THE TEETH, MOUTH AND JAWS: A MANUAL FOR DENTAL PRACTICE)

Edited by Karl Häupl, Wilhelm Meyer and Karl Schuchardt. For sale in complete set only. DM.650. München, Urban & Schwarzenberg, 1954-1958.

Issue 29 contains parts of volume III (General and Specialized Surgery of the Mouth and the Jaws).

CLEFT LIP, CLEFT JAW AND CLEFT PALATE • By Richard Trauner. 79 pages with 71 illustrations.

This well-written comprehensive chapter on congenital deformities of the maxillofacial region is the product of years of the author's experience and painstaking study in hospital wards, operating rooms and pathological and experimental laboratories. It manifests an uncommon intellectual curiosity and devotion to detail on the part of the author, who has made an effort to separate fact from the clinical impression, theory, and fancy frequently found in the literature on this subject. He correlated his findings with carefully compiled data from the Clinic and Polyclinic of the Dental School of the University of Graz, Austria, and from his own practice.

The extensive bibliography accompanying this contribution is carefully selected. At times the author may give the impression of being dogmatic, but in most instances the background of fact and reasoning behind his conclusions is apparent. The reader need not agree with all the ideas, definitions and methods presented to appreciate their significance.

The classification of congenital oral deformities is simple and clear. The sections on Anatomy of Cleft, Teamwork and Timing of Surgery, Surgical Methods (Langenbeck, Hagedorn, Le Mesurier, Veau, Axhausen, Trauner, Wassmund, Schuchardt, Blair and Brown, Browne, and the unilateral or bilateral Z-technic), Anesthesia in Cleft Surgery, Speech Defects and Phonetics after Cleft Surgery, Prosthetic Service in Rehabilitation After Surgery, Orthodontic Treatment of Cleft Patients, and The Dentist's Role in the Care of Cleft Patients are excellently discussed and the results carefully analyzed. Successes and failures are reviewed in an effort to improve surgery, postoperative care and rehabilitation to leave the patient with minimal disability.

This chapter is a splendid contribution and should be studied by all who are interested in congenital oral defects. However, it must be read carefully to obtain maximum value.

CLINICOPATHOLOGIC STUDY OF TUMORS OF THE JAWS AND THE SURROUNDING SOFT TISSUES • By A. Rehrmann. 71 pages with 84 illustrations.

This chapter on tumors in the oral cavity is concerned not only with the gross and microscopic characteristics of neoplasms but also with interesting aspects of the behavior and clinical effects of specific tumor types. Hematological, biochemical and endocrinological features are included where they are helpful in the understanding, diagnosis and prognosis

of the progress of malignancy.

Etiologic factors, theories on the histogenesis and controversies in classification are discussed in a manner that should be useful to both the practicing dentist and the oral surgeon. Full understanding of the histogenetic problems is possible only through comprehension of the normal development of specific parts of the oral cavity; therefore, certain aspects of embryology and structural function are included. This is helpful in emphasizing similarities and differences existing between normal and abnormal tissue reactions, especially between hyperplastic and neoplastic processes. The text is excellently arranged in sections according to sites and tissues involved with a histogenetic grouping of tumor types, benign or malignant, occurring in the maxillofacial region. The material presented is illustrated with many photomicrograms of common and rare tumors. The entire chapter is easy to read and well written.

Issue 29 contains also the beginning of a contribution by B. Lindemann on Irradiation Therapy, which will be reviewed at a later date.

Issues 30 and 31 contain parts of volume I (Anatomy, Physiology and Pathology).

ORAL PATHOANATOMY • By W. Rotter and H. Lapp. 266 pages with 237 illustrations.

This chapter on oral pathology and anatomy reflects recent changes in relative values which have taken place in the subject literature. It also emphasizes the importance of a closer correlation between studies of structures with research on function, and introduces a biologic implication into the field of oral pathoanatomy in its relation to general and specialized dental practice.

The combined work of outstanding authors has been edited smoothly to produce a text of uniformly readable quality. The introductory section presents fundamental material on oral inflammations. It is followed by sections on Disturbances of the Protein Metabolism, Dystrophy of the Jaws, Cysts in the Oral Cavity, Hyperplasia and Neoplasms, Blood System, Connective Tissue, Locomotor, Respiratory and Masticatory Systems, Glands, and Central and Peripheral Nervous Systems.

There is a wealth of illustrations. The pathoanatomical views are directly and explicitly labeled, a relief to readers who otherwise would have to decipher many abbreviations and fine-print legends. The section on abnormal growth presents much new, interesting and valuable material. A large bibliography concludes this interesting contribution.

Paul H. Glucksman

NEW AND NONOFFICIAL DRUGS 1958

American Medical Association Council on Drugs. 675 pages. Index. $3.35. Philadelphia, J. B. Lippincott Co., 1958.

New and Nonofficial Drugs (NND) is the new name for *New and Nonofficial Remedies* (NNR). The Council on Drugs is the new name for the Council on Pharmacy and Chemistry.

NND is revised annually. It contains descriptions of drugs generally available in the United States and which have been on the market less than 20 years. In most cases the drugs are useful, but an occasional one still in the experimental stage or of questionable value is described. Thus, NND is a comprehensive compendium of reliable information concerning the most important newer drugs.

Many chapter headings have been changed in the current annual revision, and there has been more than the usual reorganization of the contents. For example, the tranquilizers are now grouped under pharmacologic headings such as "Antihistamines," "Selective Central Nervous System Depressants," and "Skeletal Muscle Relaxants." Thus, the fact that the tranquilizers differ only in degree from other sedatives and other relaxants is formally recognized.

The new monograph for povidone-iodine, an antiseptic, will interest dentists. Monographs for many antibiotics and sedative drugs have also been added. Although all drugs described in NND are listed under their generic names, trade names are given at the end of each monograph.

A new feature is the routine listing of the kinds of preparations which are commercially available. For example, at the end of the monograph on penicillin V, the following statement appears: "Preparations: capsules 200,000, 400,000 units; suspension (injection) 150,000 units in 1 cc.; 150,000, 300,000 units in 5 cc.; suspension (oral) 150,000, 300,000, 400,000 units in 5 cc.; tablets 200,000, 500,000 units." This device tells the reader what the pharmacist is likely to have in stock without cluttering up the book with specific mention of all the multitudinous preparations of the various manufacturers.

NND 1958 is 62 pages longer than the 1957 book. Forty-eight new monographs are included.

NND continues to lead its field as a source of authoritative information concerning the newer drugs currently important in medicine. Many dentists and all dental libraries will want to have the 1958 edition.

Donald A. Wallace

THE VOCABULARY OF DENTISTRY AND ORAL SCIENCE

By George B. Denton. 207 pages. Index. $4. Chicago, Bureau of Library and Indexing Service, American Dental Association, 1958.

The first few pages of this book supply an excellent account of what prompted its writing, the purpose of it, and an outline of the plan adopted to achieve its end.

In a two-page foreword, Donald Washburn, director, Bureau of Library and Indexing Service, gives the background needed for an intelligent comprehension of Dr. Denton's book. This is followed by six pages in which the author explains the purpose and plan of his work.

The book "is intended as a manual of instruction on the terminology of the health professions and sciences, especially dentistry." Unlike ancient Gaul, which had three parts, this book has four. The first of these, "Foundations of Scientific Language," in 75 pages, is the longest. Obviously it should be, for undoubtedly it is here that those for whom the book is intended will need most instruction and guidance. It is safe to assume that dentists are in the same boat with the rest of us when it comes to ignorance about such subjects as "Characteristics of Scientific Language," "Principles of Choice and Coinage of Terms," and "Dictionaries and Other Language Aids." What Dr. Denton says in this part has pertinence for all of us interested in terminology.

The next part deals with "Special Nomenclature Problems of the Dental Branches." Most of it is taken up with a discussion of the nomenclature problems of operative dentistry, prosthodontics, oral surgery, and orthodontics. Concise information is supplied about each of these departments of dentistry, and their names explained.

Part 3, "Procedures for the Solution of Dental Nomenclature Problems," is the one in which Dr. Denton's long training and sound judgment shows to excellent advantage in such chapters as those on "How to Write a Useful Definition," "How to Choose the Preferable Term," "When and How to Coin an Acceptable Term."

In the last part of the book the author deals with "Selected Dental Vocabulary with Critical Notes." The terms selected for instructive comment here are extremely interesting, even to a mere layman having no particular acquaintance with the terminology in this field. For example, the author says of hypnodontics that it was introduced about 1950, and encountered criticism "on the grounds that it implies an effect upon the teeth and not on the whole personality . . . It is a procedure only, and is better represented by the term 'hypnosis in dentistry'."

Dr. Denton is certainly not among those unfortunates who require maximum wordage to impart minimum content—or, sometimes, no content at all. The book exhibits throughout a fine appreciation of the value of words, and the wickedness of wasting time. No one can read its crisp, clear pages without feeling that here is the work of a mature scholar of sound judgment.

The book is a must for all students and practitioners of dentistry.

M. M. Mathews

THE NORMAL CHILD: SOME PROBLEMS OF THE FIRST FIVE YEARS AND THEIR TREATMENT

By Ronald S. Illingworth, M.D. Second edition. 356 pages with 69 illustrations. Index. $7. Boston, Little, Brown, 1957.

The author, who was professor of child health at the University of Sheffield, England, has written this book "to describe the problems other than diseases which arise in the normal child during the first five years." Among the subjects covered in various sections are behavior problems, feeding problems, problems of physical and medical development, and problems of preventive pediatrics.

The book is intended for medical personnel who are concerned with the care of children, especially family doctors and doctors in child welfare services. The author hopes it also will help professional persons to deal with their own children.

The section on behavior problems would seem to be of special interest to the dentist who includes children in his practice. The author bases his writing on the premise that all normal children have behavior problems. He devotes 12 chapters to behavior problems of children. The headings indicate the wide scope of his presentation:

Relevant Features of the Psychological Development of the Child; Parental Attitudes and Management; Discipline and Punishment; Anorexia and Other Eating Problems; Sleep Problems; Problems of Sphincter Control; Crying, Temper Tantrums and Breath-holding Attacks; Body Manipulations; Jealousy, Fears, Shyness and Other Problems; The Prevention of Accidents; Toys and Play; Nursery School; and finally, The Sick Child, and the Child in Hospital.

J. M. Wisan

THE INFLUENCE OF WAR AND POST WAR CONDITIONS ON THE TEETH OF NORWEGIAN SCHOOL CHILDREN

By Guttorm Toverud, Ph.D., Oslo; F.D.S.R.C.S. England and Edinburgh. 235 pages with 48 charts and 59 tables. Reprinted from The Milbank Memorial Fund Quarterly October 1956, April 1957, and October 1957.

These reprints of three articles are well prepared and adequately documented with very complete references at the end of each part.

The first article, "Eruption of Permanent Teeth and Status of Deciduous Dentition," well illustrates the importance of the care of the deciduous dentition to decrease the early eruption of permanent teeth. By this change in eruption rate it can be inferred tooth formation is improved.

Part II, "Caries in the Permanent Teeth of Children," gives further conclusive evidence of the importance of proper nutrition in reducing the incidence of attack by caries.

Part III is an interesting summation of dental conditions in Norway and other European countries, with a discussion of food supply showing that war conditions had a favorable influence on the total health of the population in addition to beneficial effects on the teeth.

This reprint is a valuable contribution and is recommended for dentists and all allied professions interested in the control of dental diseases.

Charles A. Sweet

BOOKS RECEIVED BUT NOT REVIEWED

DIE PERLON—ARMIERUNG IN DER ZAHNÄRZTLICHEN KUNSTSTOFFPROTHETIK • By Paul Brandau and Irmg. Brandau. 88 pages with illustrations. Berlinische Verlagsanstalt, Berlin W15, Germany, 1956.

HEALTH IN CALIFORNIA: CALIFORNIA HEALTH SURVEY, STATE OF CALIFORNIA, DEPARTMENT OF PUBLIC HEALTH • By Malcolm H. Merrill, M.D. 96 pages. $1.50. California State Printing Office, Documents Section, N. Seventh St. and Richards Blvd., Sacramento, Calif., 1957.

INDEX TO ORTHODONTIC LITERATURE-1954 • By Alberto J. Cervera. 91 pages. A. J. Cervera, Avenida del Oeste, 29, Valencia, Spain, 1957.

INDEX TO ORTHODONTIC LITERATURE—1955 • By Alberto J. Cervera. 56 pages. A. J. Cervera, Avenida del Oeste, 29, Valencia, Spain, 1957.

HYPNOSIS IN MEDICINE AND SURGERY—originally entitled MESMERISM IN INDIA • By James Esdaile, M.D. Introduction and supplemental reports on HYPNOANESTHESIA by William S. Kroger, M.D. 259 pages. $4. The Julian Press, Inc., 80 E. 11th St., New York, 1957.

WAS ENTHALTEN UNSERE NAHRUNGSMITTEL? • By W. Heupke and G. Rost. 111 pages. 12.50 DM. Umschau Verlag, Stuttgarter Strasse 20-24, Frankfurt Am Main, Germany.

HYPNOGRAPHY: A STUDY IN THE THERAPEUTIC USE OF HYPNOTIC PAINTING • By Ainslie Meares, MBBS. 271 pages with illustrations. $7.75. Charles C Thomas, 301-327 E. Lawrence Ave., Springfield, Ill., 1957.

LE PARODONTOPATIE GIOVANILI RAPPORTI FRA MALOCCLUSIONI E PARODONTOPATIE • By Dott. B. Miotti. 44 pages with illustrations. La Garangola, Padova, Italy, 1957.

STEPS FOR TODAY TOWARD BETTER MENTAL HEALTH: POINTERS TO ACTION FOR ALL WHO GIVE HEALTH SERVICES. REPORT OF THE 1957 NATIONAL HEALTH FORUM • Edited by Josephine Nelson and Elizabeth M. Dach. 117 pages. $1.50. National Health Council, 1790 Broadway, New York, 1957.

DIE "MUCO-SEAL-PROTHESE" • By Werner Peutsch. 63 pages with illustrations. 8.40 D.M. Carl Hanser Verlag, Kolbergerstrasse 22, Munich, Germany, 1957.

THE ROCKEFELLER FOUNDATION ANNUAL REPORT, 1956 • 435 pages with illustrations. The Rockefeller Foundation, 49 W. 49th St., New York.

SCHOOL HEALTH PROGRAM ESSENTIALS—ADMINISTRATORS CHECK LIST, Tulare County School Health Advisory Board • Edited by Burt M. Kebric, Ed.D. 8 pages. $1. Tulare County School Health Advisory Board, Room 202 Courthouse, Visalia, Calif.

PSYCHIATRY AND CATHOLICISM • By James H. VanderVeldt, O.F.M., Ph.D. and Robert P. Odenwald, M.D. 2 ed. 474 pages. $6.25. McGraw-Hill Book Company, Inc., 330 W. 42nd St., New York, 1957.

ENCYCLOPAEDIA BRITANNICA • Edited by Walter Yust, 27,247 pages with illustrations. Encyclopaedia Britannica, Inc., 425 N. Michigan Ave., Chicago, 1958.

Current Literature

EFFECTS OF RADIATION

John H. Manhold, Jr. New York D.J. 24:117 March 1958.

Because of the importance that atomic fission has assumed for all people today, and because of the role that dentists are expected to play as part of the health team in the event of a national emergency involving atomic bombs, a basic knowledge of atomic radiation and how it relates to the knowledge of radiation that he already has is necessary to the dentist.

Atomic fission is accomplished by striking the nucleus of certain heavy atoms, such as uranium or plutonium, with neutrons of great energy. Each collision produces two new atoms of lower atomic number, and also a tremendous amount of free energy, some of which occurs as "particulate radiation."

Particulate radiation, or radiation from particles, is believed to result from the movement of the particles, just as electromagnetic radiation is thought to result from the motion of electromagnetic waves. Particulate radiation also may be generated by accelerating to high speeds certain particulate substances, such as electrons, neutrons and deutrons, or it may be the product of the decay of naturally occurring substances, such as uranium. Regardless of the means by which particulate radiation is produced, the particles which are given off are referred to as alpha and beta particles and gamma rays. Alpha particles are "heavy," for they consist of helium nuclei. Beta particles are much lighter and consist of negatively charged electrons. Both are in rapid motion. They form the major portion of particulate radiation. The third component, the gamma ray, is a type of electromagnetic wave which falls in the electromagnetic spectrum just below the roentgen rays with which all dentists are familiar.

The shorter the wavelength, the greater is the penetrating power of rays. Wavelengths generated by about 35 to 75 kv., for example, are employed for ordinary diagnostic roentgenography. For radiation therapy, however, even shorter wavelengths (generated by from 100 to 300 kv. or 400 kv.) are necessary. A thickness of lead is needed to stop these rays in unneeded areas. Gamma rays are still shorter than these, and thus are of an even more damagingly penetrating nature, requiring even greater precaution against undesired penetration. Alpha and beta particles, on the other hand, do not have great powers of penetration. Alpha particles can be stopped in large part by a few layers of paper, and beta particles by some slight thickness of aluminum.

The effects of radiation depend on many variables, such as the wavelength, intensity, distance from source, nature of the tissue involved, and so forth. Short rays of the roentgen or gamma variety, when encountered briefly and at comparatively great distances, appear at first to produce no changes whatsoever on the skin or elsewhere. The exposed person experiences no sensation of heat, pain, or warning of any other nature. If the concentration of rays has been sufficient, however, 6 to 14 days after exposure an extensive and lasting erythema of the skin, accompanied by necrosis, will occur. Furthermore, much damage will have been done to many of the underlying tissues. The reproductive organs are the most easily harmed. Next are the blood and the blood-forming organs, the lungs and the gastrointestinal tract. Mature bone and cartilage are relatively resistant, but endochondral growth of these tissues in children is impaired by even small dosages of gamma rays. In other words, the less specific the differentiation of a tissue, the more susceptible it is to radiation damage. The damage is brought about both by the ionizing properties of the specific rays and particles, and by the direct action of the rays and particles. A penetrating ray may be conceived as a sharp, hard projectile. When this projectile passes through a cell, it may break or tear the cell. If only the membrane and cytoplasm of the cell are affected, its surface properties can be altered so that the cells tend to stick together. If the ray, in its passage, strikes one or more chromosomes, these can be torn or broken, and a different cellular structure and mutation occur.

EXTRINSIC FACTORS

T. M. Graber. Am.J.Orthodont. 44:26 Jan. 1958.

The dental arch is a resultant of many things, including hereditary pattern, as modified by postural and functional muscle forces, by habits, disease, injury and perhaps by orthodontics.

Postnatal extrinsic environmental factors may be listed as follows: (1) predisposing metabolic climates, endocrine abnormalities, and disease; (2) the temporomandibular joint;

(3) the dynamic role of the musculature, and (4) habit factors (this is really a part of the muscle picture, but other factors are involved).

Normally, at rest there is a balance of extraoral and intraoral muscular forces, with the buccal and perioral musculature having a passive restraining influence on the anterior displacement of the teeth. The buccinator mechanism runs posteriorly to the pterygomandibular raphe, decussating with fibers of the superior constrictor muscle that carry on around and anchor at the pharyngeal tubercle of the occipital bone. This bony attachment is not essential to maintain the *status quo*, however, for all the facial muscles are intimately related to the postvertebral, prevertebral, and cervical musculature, so that a change in one muscle would influence relationships with the other muscles.

Thus, the original malocclusion may have been the result of a hereditary pattern, but has been made worse by the compensatory malposition and malfunction of the associated musculature.

This leads directly into a discussion of habits as causative elements in malocclusions.

Duration, frequency, and intensity must qualify the conclusions of the psychologist, pediatrician, and orthodontist in determining the existence and degree of structural and functional deformity.

William F. Ford

CRITERIA TO CONSIDER WHEN SUPPLEMENTING FLUORIDE-BEARING WATER

David F. Striffler. Am. J. Pub. Health 48:29 Jan. 1958.

The purpose of the study was to explore some of the criteria that should be considered when supplementation of a fluoride-bearing community water supply comes under discussion by a body of community officials.

The problems to be investigated were:

1. Evaluation of the source, fluoride content, seasonal variations and stability of the current water supply.

2. The assessment of the degree of deficiency of the fluoride content in relation to unusual climatic conditions.

3. Determination of the extent of reduction in DMF to be expected at 0.6, 0.7, 0.8 and 0.9 ppm F.

Only two cities helped determine the slope of H. T. Dean's curve between the range of 0.5 and 1.0 ppm F and additional data from a wide source have been gathered in an effort to supplement the meager data within this range. By combining the new data with Dean's original, a graph can be formulated from which it may be possible to predict roughly the probable amount of reduction in DMF to be expected at a given level of fluoride. This reduction in DMF might be made more understandable to community officials if estimated in terms of dollars and cents saved or interpreted as an increased percentage of children who would show a reduced number of decayed, missing or filled teeth.

A further step is the estimation of the cost of installation of such a plan to the community.

Although emphasis is usually laid on these preceding tangible criteria, there are several other factors that might be considered:

1. Reduction in the number of emotional experiences associated with odontalgia.

2. Ease or difficulty with which authority to fluoridate may be accorded by the governing body.

3. The additional problems of climate, prevalence of dental caries, availability of competent water works staff and the economic status of the community.

Gilbert I. Brinsden

DENTAL CARIES SAMPLE SURVEY 1957

John P. Birmingham. Irish D.Rev. 3:83 Winter 1957-1958.

A dental survey of 1,408 children attending the primary schools in the Waterford County Borough area of Ireland showed that the average DMF rate of the first permanent molar per child was 2.7, ranging from 1.8 in six year old children to 3.7 in 12 year old children.

One hundred of the children examined whose ages were 6, 8, 10 and 12 years had been breast-fed for periods longer than three months. The average DMF rate for the first permanent molar is slightly lower for these 100 children than for those children who were fed artificially. The findings support those of the Medical Research Survey on breast-feeding.

It was observed also that measles occurred at a later age in breast-fed children. Measles and other infectious diseases contracted in childhood may cause permanent defects in the unerupted teeth, depending on the age and general health of the child when it contracted the infection.

Breast-fed children were less in need of orthodontic treatment, due presumably to the fact that the nature of breast-feeding causes the mandible to be thrust forward, which tends to correct malocclusion.

OCULAR DISEASE OF DENTAL ORIGIN: REPORT OF CASE

A. Grosman. Inform.dent.,Paris 39:1213 Aug. 15, 1957.

During routine dental examination, the patient, a 36 year old man, complained that immediately after the extraction of his lower third molar—performed three months previously—weakness and disturbance of vision occurred. He had to wear eye shades or sun glasses continuously.

The patient had been examined and treated by an ophthalmologist who, however, was not able to determine the cause or to obtain improvement. The following symptoms were established; hyperemia of the conjunctiva, epiphora, tremor of the left upper eyelid and an intolerance of light. The patient's right eye was not affected but his left eye was severely inflamed and closed.

The dentist took full-mouth roentgenograms from different angles. The presence of an impacted third molar in the left upper jaw was established. After surgical removal of the impacted tooth under local anesthesia, all ocular symptoms subsided. Fourteen days after the operation, the patient was able to abandon the wearing of eye shades or sun glasses. There was no increased flow of blood in the conjunctiva, no abnormal overflow of tears down the cheek, no involuntary trembling of the eyelid, and no abnormal intolerance of light.

EPICONDYLITIS, AN OCCUPATIONAL DISEASE OF DENTISTS

Walter Drum. Quintessenz 9:1019 Feb. 1958.

Epicondylitis (tennis elbow) is a common and troublesome disease which often afflicts dentists. It is characterized by pain originating around the outer side of the elbow joint at or below the lateral epicondyle. Frequently pain radiates to the forearm.

Epicondylitis appears in two forms: intra-articular and extra-articular. Although the exact pathology is debatable, the most commonly favored etiologic theory is that the symptoms result from an incomplete tearing of the lateral epicondyle of the humerus caused either by repeated minor traumas or by a single traumatic incident.

In most instances conservative treatment is successful in alleviating or completely relieving the painful symptoms. Physical therapy may be helpful.

Five dentists with severe epicondylitis were recently treated with a local injection of 25 mg. (1 cc.) of hydrocortisone. Dramatic relief was obtained in four patients. One patient did not respond immediately to this therapy, but gradually the symptoms subsided after further conservative treatment. The patient was able to carry on his work at the dental office without difficulty.

The rationale of using hydrocortisone locally in the region of the external epicondyle is the indicated inhibition of the formation of fibrous tissue. It is generally believed that in dentists epicondylitis is basically an incomplete tearing of the origin of the extensor muscles of the forearm from the lateral epicondyle. Repeated attempts at repair are constantly interrupted by functional trauma produced by further occupational activity. Hydrocortisone injection interrupts this vicious cycle by promoting secondary vascular and nerve reactions.

The pathologic lesion underlying the syndrome of epicondylitis is a comparatively small focus of hyaline degeneration in the extensor muscle. The success of hydrocortisone treatment depends more on placing the injection exactly at the region of this focus than on any other factor.

VINCENT'S INFECTION

Gerald P. Ivancie. Pract.D.Monogr. 1-28 March 1958.

Necrotizing ulcerative gingivitis is one of the most interesting, confusing and least understood periodontal disorders with respect to etiology, bacteriology and therapy. The disorder is called Vincent's infection, trenchmouth, Vincent's stomatitis, ulceromembranous stomatitis, and fusospirillary gingivitis. Until the etiology is understood the term "necrotizing ulcerative gingivitis" is recommended, as it describes both clinical and pathologic features.

The disorder is most often an acute inflammatory process characterized by painful ulceration involving the papillae or the marginal gingivae or both. The disorder may have a short, intense and severe course. The most important symptoms are painful and sensitive gingival tissues, a metallic taste and loss of appetite and sleep. Fetid odor, increased salivation, malaise and a rise in temperature may or may not be present. The ulcers usually start at the tips of the interdental papillae; ulcers may be covered by a grayish pseudomembrane. Hemorrhage and regional lymphadenopathy may appear.

The etiology is uncertain. The acute symptoms may be caused in part by bacteria, for when the bacteria are suppressed the acute symptoms tend to disappear.

The bacteriologic smear does not vary qualitatively in such conditions as necrotizing ulcerative gingivitis, periodontitis, marginal gingivitis, pericoronitis and herpetic gingivostomatitis; the smear may be valuable as an aid only in differentiating such conditions as necrotizing ulcerative gingivitis, moniliasis, actinomycosis, diphtheria and streptococcal stomatitis.

Four methods of treatment are recommended in managing necrotizing ulcerative gingivitis: (1) correction of local factors; (2) evaluation and correction of systemic factors; (3) drugs, and (4) correction of deformities of the periodontium.

The practice of treating afflicted patients with antibiotics without local therapy cannot be too strongly condemned. The prognosis of necrotizing ulcerative gingivitis is favorable, provided proper treatment is begun early and patient cooperation is achieved. Failure to correct residual interproximal craters, periodontal pockets, defective restorative dentistry and pericoronal flaps may result in a recurrence of the disorder.

The condition exists most frequently in those in the late adolescent and immediate postadolescent groups.

ORAL HERPETIFORM LESIONS TREATED WITH GAMMA GLOBULIN

L. P. Strean, B. H. Williams and John Prichard. Oral Surg., Oral Med. & Oral Path. 11:266 March 1958.

Ulcerative lesions of the oral mucous membrane have been called variously, herpetic gingivostomatitis, recurrent aphthous stomatitis, Behçet's syndrome, canker sores, recurrent aphthae, herpes labialis, herpes simplex, cold sores and fever sores. Practically all authors agree that herpetic gingivostomatitis is caused by the herpes simplex virus, whereas recurrent aphthous stomatitis is believed to be noninfectious and of unknown origin.

This article suggests a new terminology for the vesicular form of oral lesions and a new treatment for this recalcitrant disease of the oral cavity.

Herpetic gingivostomatitis is characterized by an eruption of multiple transparent vesicles which usually are confined within the epidermis. As the blisters break and the expressed fluid dries, an adherent yellow crust forms. The eruptions may be accompanied by fever, malaise, fetor oris and increased salivation.

Recurrent aphthous stomatitis is characterized by discrete or multiple vesicles which, on breaking, have a grayish surface surrounded by an erythematous zone. Fever, fetor oris and increased salivation are not present.

Since herpes simplex virus has been cultivated from the lesions and from the saliva of patients suffering from herpetic gingivostomatitis, and since this virus has not been cultivated from oral aphthae, some authors believe that the latter are noninfectious. The possibility exists, however, that oral aphthae may be caused by an unknown virus simulating herpes simplex. The antibody titer for herpes simplex virus in the presence of either herpetic gingivostomatitis or oral aphthae usually is high. Because of the doubtful origin of these lesions, is is suggested that they be called "herpetiform lesions."

Human poliomyelitis immune globulin, also known as gamma globulin, contains significant concentrations of the antibodies useful in attenuation or prevention of poliomyelitis, measles and infectious hepatitis. Since this blood fraction taken from a large pool of blood presumably contains antibodies against other infectious agents, an attempt was made to test its effect in the treatment of herpes zoster and chickenpox. The results of treatment in 11 patients appeared encouraging. Because of this, an attempt was made to expand its usage to include the treatment of herpetiform lesions of the oral cavity.

The five case reports cited are representative of a series of 25 cases in which gamma globulin was used for the prevention or treatment of herpetiform lesions of the oral cavity. The patients' ages ranged from 15 to 50 years, and there were 18 women and seven men. All patients received gamma globulin; the smallest dose was 3 cc. and the largest was 20 cc. In some patients only one 3 cc. injection brought relief; in other patients daily injections of from 10 cc. to 20 cc. for six weeks were necessary to produce full recovery.

The results of treating herpetiform lesions of the oral cavity with gamma globulin are sufficiently encouraging to warrant further clinical trial. Traumatic, physiologic or severe emotional stress may play a significant role in the etiology of vesicular stomatitis.

EFFECT OF DRILLING INTO BONE

Henry C. Thompson. J. Oral Surg. 16:22 Jan. 1958.

The histologic response to drilling and thermal changes in bone resulting from drilling were studied in order to determine whether aseptic thermal necrosis could be controlled.

Two types of studies were carried out. Extra skeletal pins were drilled in the mandibles of

dogs at speeds of 125, 250, 500, 1,000 and 2,000 rpm, and the response of the bone to these drill speeds was studied histologically. In the second part of the study, the effects of the various speeds on the temperature of the pin immediately after drilling, and of the neighboring bone during drilling, were determined.

The acute histologic reactions in bone were hyperemia, degeneration of osteocytes, change in bone stainability, and tears and fragmentation of the bone edges around the drill holes. These reactions increased in severity with the increasing drill speed and were more pronounced 72 hours after the operation than at either 24 or 48 hours.

Thermal changes in the external and internal portions of the pins were slight. Thermal changes in the bone, however, increased with the increase in drill speeds, ranging from 38.3 to over 65.5° C.

The various drill speeds studied were evaluated on the basis of the histologic reaction, thermal changes, mechanical effects, ease of penetration of bones, and steadiness of application in order to determine a drill speed that would be desirable in clinical use, and would produce minimal histologic and thermal changes in bone. This evaluation suggested a desirable speed to be in the neighborhood of 500 rpm with the power drill.

USE OF ANORGANIC BONE IMPLANTS IN ORAL SURGERY

Philip J. Boyne and Fred L. Losee. J. Oral Surg. 16:53 Jan. 1958.

The organic fraction of bovine femoral bone particles was removed by the process of ethylenediamine extraction. The inorganic product was termed "anorganic bone." In order to study the response of oral tissue to implants of this heterogenous anorganic osseous material, various particle sizes of anorganic bovine bone were inserted into 16 separate surgically created mandibular and maxillary bony defects of nine rhesus monkeys. At autopsy, specimens of grafts were obtained from 6 to 59 days postoperatively.

Evaluation of clinical, roentgenographic and histologic evidence indicates acceptance of the graft particles with a complete lack of foreign body reaction. Revascularization of the graft material together with reactive bone formation was present as early as 13 days postoperatively. The results of this work indicate that there is biological host acceptance of heterogenous anorganic bone transplants in mandibular and maxillary osseous defects of the oral cavity.

An apparently favorable environment for osteogenesis is established in these implanted regions. It is believed that anorganic bone offers a new source of osseous tissue which could be applied to many oral surgical procedures as a substitute for autogenous or banked homogenous bone.

THE GROWING SHORTAGE OF DENTISTS IN THE UNITED STATES

Quentin M. Smith. Am. J. Pub. Health 48:38 Jan. 1958.

The rapid post-World War II growth in the United States has presented a serious challenge to those concerned with the problems of dental health. For many reasons the supply of dental personnel over the past 25 years has fallen far short of the requirements of the nation. Today with twice as many dentists graduating as in prewar years there is only one dentist for 2,170 people whereas in 1930 there was one dentist for 1,730 people.

The assessment of future dental needs is imperative if an intelligent plan for orderly expansion of dental training facilities is to be developed. Differences which are both significant and disturbing exist from state to state and from region to region in the number of dentists at present being supported from identical amounts of consumer income. The best supplied state has three times as many dentists in relation to purchasing power as the most poorly supplied state. The average state supports one dentist for every 4.3 million dollars of income, and the average for the 24 top states, one for every 3.6 million dollars. The amount a state may spend on dental care depends on:

1. The number of dentists available.
2. The standard of general education.
3. The type of population group.

The problem in developing future estimates of manpower requirements would be to reflect not only existing state-to-state differences but also to take into account any future changes which may be anticipated in each state. The Division of Dental Resources, Public Health Service, has developed, over the past two years, such an estimating technic by selecting two hypothetical states of which one is the average state and the other the average among the top 24 states. All estimates are based on the demand levels prevailing in these two hypothetical states in 1955.

It was found that 13,500 additional dentists would be necessary to satisfy demands equivalent to those being met in the top 24 states. The areas of immediate need in order of urgency are the Great Lakes region, the Far

West, the Middle Atlantic States and the Southwest. The regions least affected by the deficit are the Midwest and Rocky Mountain States. The regions of serious deficit and those least affected represent the situation as it is at the present time, a situation which is relative and is subject to constant change.

Gilbert I. Brinsden

A NEW LOOK AT THE ETIOLOGY OF CLEFT PALATE BASED ON A STUDY OF 164 FAMILY HISTORIES

Eleanor J. Stiegler and Mildred F. Berry. Plast. & Reconstr. Surg. 21:52 Jan. 1958.

A study of the family histories of 164 children entered for speech therapy in the Cleft Palate Center at Rockford College, Rockford, Ill., led to the following conclusions:

1. The belief of other investigators is supported that the chief etiologic basis of cleft palate and other structural malformations resides in genic transmission. Cleft palate and other structural malformations may be caused by a common "malformation gene."

2. The high incidence of speech defects noted in the families of children with cleft palate lends support to the theory of genic transmission of neural or anatomic deficiencies.

3. The study confirms the belief of other investigators that Rh negative blood is not related to the occurrence of cleft palate.

4. The study supports the belief of other investigators that poor nutrition in the mother is either a precipitating factor or an independent cause of cleft lip and cleft palate.

5. The study gives support to the hypothesis of a relationship among defective nutrition, prematurity, spontaneous abortion, stillbirth and cleft palate.

6. There may be a relationship between twinning and cleft palate.

7. Since prematurity and multiple births are related and since they both may be related to cleft palate, then all three factors—prematurity, multiple births and cleft palate—may be interrelated.

8. Since there is a high incidence of spontaneous abortions and stillbirths in the families of children with cleft palate, spontaneous abortion and stillbirth may be related to cleft palate. The occurrence of spontaneous abortion or stillbirth just before the birth of the propositi tends to heighten the chance of the occurrence of cleft palate or other structural abnormalities.

ENDODONTICS: BASIC PRINCIPLES AND PROCEDURES

Harry Albert. Illinois D.J. 27:73 Feb. 1958.

Consideration is given to the maintenance of the natural mechanism of defense and repair, with a minimum disturbance of viable tissues in the apical region. The nature of response to injury is contingent on the severity of the cause and the susceptibility of the affected tissue.

The four basic phases in the procedure presented are: adequate opening of the pulp cavity, thorough cleansing of same, drying and filling the canal. Sterile hot water irrigation is recommended as an effective method of cleansing the pulp chamber and canal. This is accomplished by the use of a Luer-type glass syringe with a curved blunt needle. Acetone is used to dry the canal because of its hygroscopic and volatile properties. Removing moisture is accomplished further by the use of a heated instrument or heating apparatus. Gutta-percha is suggested for filling the canal, using a minimum amount of chloroform to control shrinkage.

After endodontic treatment is completed, attention is directed to a consideration of the periapical region. Although the true status of the periapical tissues can be evaluated only by biopsy, the decision for surgical intervention must rest on a clinical evaluation of the past history, which embraces roentgenographic findings, periodic swellings or periodontitis and periapical tenderness.

A vertical incision is recommended, because it does not cut across the neurovascular elements and fibrous attachments, thereby preserving the blood supply in the flap. The incision is begun interproximally, and directed toward the site of the lesion. A mucoperiosteal flap is retracted, the outer plate removed, the root end prepared, and the region curetted and aspirated. A heated burnisher is used to smooth-pack the gutta-percha at the root end. Blood is allowed to fill the cavity. The flap is replaced and sutured. Care must be exercised to avoid trauma to the involved tissues.

The use of a minimum number of instruments and drugs is stressed. A glass bead sterilizer, maintaining a temperature from 450° - 470° F. affords a method of chairside sterilization which seems to be effective. Asepsis is emphasized throughout the entire procedure.

E. A. Lieban

Deaths

Andrews, Percy W., Philadelphia; University of Pennsylvania School of Dentistry, 1901; died April 8; age 81.

Armstrong, Klatte R., Atlanta, Ga.; Atlanta Dental College; died March 29; age 75.

Badger, Augustine P., Baltimore; Baltimore College of Dental Surgery, University of Maryland, 1889; died April 1; age 95.

Bechtold, George W., East Jordan, Mich.; University of Michigan School of Dentistry, 1911; died February 17; age 67.

Bennett, Jess R., Indianapolis; Chicago College of Dental Surgery, 1916; died February 4; age 69.

Bishop, John A., Paterson, N. J.; University of Maryland Dental Department, Baltimore, 1904; died March 15; age 75.

Bonney, Dorothy G., Woodbury, Conn.; Tufts College Dental School, 1919; died March 18.

Bransfield, Jerrold F., Middletown, Conn.; University of Pennsylvania School of Dentistry, 1908; died April 6; age 71.

Bumstead, Carl A., Lincoln, Neb.; University of Michigan School of Dentistry, 1911; died April 24; age 70.

Burden, Claude S., Hogansville, Ga.; Southern Dental College, Atlanta, 1910; died April 4; age 69.

Cain, Edward A., New York; New York College of Dentistry, 1910; died April 9; age 69.

Cannon, Thomas C., Fern Park, Fla.; Detroit College of Medicine, Department of Dental Surgery, 1902; died March 31; age 81.

Cavers, William W., St. Petersburg, Fla.; Baltimore College of Dental Surgery, University of Maryland, 1895; died April 5; age 83.

Clark, Harden, Midway, Pa.; University of Pittsburgh School of Dentistry, 1928; died March 22; age 56.

Claypool, Albert B., Carmel, Ind.; Indiana Dental College, 1910; died March 30; age 73.

Cole, Jasper F., Aurora, Neb.; Lincoln Dental College of Cotner University, 1909; died March 21; age 74.

Cooney, Thomas S., Schenectady, N. Y.; University of Pennsylvania School of Dentistry, 1907; died March 8; age 74.

Dahlman, G. Dolph, Toppenish, Wash.; North Pacific College of Oregon School of Dentistry, 1907; died March 22; age 71.

Danker, Israel, Silver Spring, Md.; Baltimore Medical College Dental Department, 1909; died January 6; age 80.

De Haas, Ira L., Hillsboro, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1909; died April 4; age 73.

Dennison, Walter H., Davenport, Iowa; University of Iowa, College of Dentistry, 1926; died March 15; age 56.

Derbyshire, Raymond A., Skowhegan, Maine; Tufts College Dental School, 1911; died April 2; age 71.

Devney, Henry L., Yakima, Wash.; Chicago College of Dental Surgery, 1912; died February 24; age 67.

Dumont, Harold B., Skowhegan, Maine; Baltimore College of Dental Surgery, University of Maryland, 1924; died April 1; age 61.

Edson, Ralph B., Ellsworth, Maine; Harvard Dental School, 1914; died February; age 68.

Eisenstein, Sylvan, Doniphan, Mo.; St. Louis University School of Dentistry, 1918; died March 19; age 66.

Ejde, Anders, Poulsbo, Wash.; North Pacific College of Oregon, School of Dentistry, 1918; died March 19; age 66.

English, William K., Wauwatosa, Wis.; University of Iowa College of Dentistry, 1903; died January 16; age 81.

Flicker, Sol J., Kearny, N. J.; New York College of Dentistry, 1924; died March 29; age 54.

Flood, Arthur M., San Francisco; University of California College of Dentistry, 1895; died March 24; age 85.

Fox, Edward E., Bristol, Conn.; Philadelphia Dental College, 1923; died March 21; age 58.

Frame, Ward A., Parkersburg, W. Va.; Ohio Medical University College of Dentistry, 1904; died March 24; age 75.

Gerard, Vernon A., Amityville, N. Y.; New York University College of Dentistry, 1939; died February 18; age 41.

Gesell, Charles L., Brooklyn; New York College of Dentistry, 1915; died March 30; age 65.

Goldberg, Harold, New York; New York University College of Dentistry, 1933; died July 8, 1957; age 49.

Goldberg, Harry, Brooklyn; New York College of Dentistry, 1910; died January 7; age 72.

Goodson, Blane J., Arcadia, Calif.; University of Southern California School of Dentistry, 1919; died April 13; age 60.

Green, George H., Milledgeville, Ga.; Louisville College of Dentistry, 1895; died January 2; age 86.

Green, John O., Hamtramck, Mich.; Royal College of Dental Surgeons School of Dentistry, Toronto, Canada; died March 12; age 64.

Hafey, Francis X., Northampton, Mass.; Georgetown University School of Dentistry, 1913; died February 23; age 67.

Hallock, Daniel H., Ossining, N. Y.; New York University College of Dentistry, 1926; died April 2; age 63.

Harmon, Harold G., St. Petersburg, Fla.; University of Iowa College of Dentistry, 1929; died February 10; age 57.

Harrill, James G., Nashville, Tenn.; Atlanta Dental College, 1899; died December 18; age 83.

Harrison, Burgess H., Natchitoches, La.; died January 15; age 87.

Hartman, Edgar B., Ann Arbor, Mich.; Indiana Dental College, 1901; died February 3; age 78.

Harvin, Arthur L., Washington, D.C., Baltimore College of Dental Surgery, University of Maryland, 1907; died November 8; age 71.

Higgins, Edward S., Detroit; Detroit College of Medicine, Department of Dental Surgery, 1898; died April 6; age 80.

Hinz, Otto B., Oshkosh, Wis.; Marquette University Dental School, 1916; died February 22; age 65.

Hirwas, Richard U., Negaunee, Mich.; University of Michigan School of Dentistry, 1918; died February 6; age 62.

Hofferman, Alfred M., Bridgeport, Conn.; Baltimore College of Dental Surgery, University of Maryland, 1928; died April 6; age 59.

Hoffman, Abram, Fort Lauderdale, Fla.; University of Buffalo School of Dentistry, 1899; died February 23; age 83.

Hogan, Fred H., Huntingdon, Tenn.; died December 13; age 51.

Holden, Dana A., Providence, R. I.; University of Pennsylvania School of Dentistry, 1906; died March 8.

Hollander, Walter M., Chicago; University of Illinois College of Dentistry, 1941; died March 2; age 41.

Horth, Joseph J., Cleveland; Western Reserve University School of Dentistry, 1924; died February 5; age 57.

Hunt, Robert L., Lattimore, N. C.; Atlanta Dental College, 1910; died December 18; age 72.

Hunter, James S., Framingham, Mass.; Tufts College Dental School, 1919; died March 31; age 61.

Hutchinson, John W., Santa Rosa, Calif.; College of Physicians and Surgeons, 1945; died February 11; age 40.

Hutchison, Marvin C., St. Louis; Kansas City Dental College, 1908; died March 8; age 72.

Ibern Fleytas, Ramon, Puerto de Tierra, Puerto Rico; Louisville College of Dentistry, 1914; died March; age 70.

Irving, Rupert I., Needham, Mass.; Harvard Dental School, 1917; died February 3; age 63.

Isenberg, Harry, Bronx, N. Y.; New York College of Dentistry, 1923; died January 31; age 59.

Jennings, Arthur A., West Allis, Wis.; Milwaukee Medical College Dental Department, 1903; died March 14; age 90.

Johnson, George A., Minneapolis; University of Minnesota School of Dentistry, 1918; died February 3; age 63.

Johnson, George E., Minneapolis; University of Minnesota School of Dentistry, 1912; died February 7; age 68.

Johnson, Roy O., Sterling, Kan.; Kansas City Dental College, 1914; died February 10; age 66.

Jones, William C., Baytown, Texas; University of Tennessee College of Dentistry, 1905; died December 8; age 76.

Kaplan, Hyman S., Plymouth, N. H.; Tufts College Dental School, 1933; died February 7; age 49.

Kassels, Henry, Lynn, Mass.; Harvard Dental School, 1919; died January 23; age 68.

Kaufman, Frank, Yonkers, N. Y.; New York College of Dentistry, 1912; died January 16; age 70.

Keim, Iva Lee, Fremont, Neb.; died December 20; age 78.

Kemp, Phineas A., Chelan, Wash.; North Pacific College of Oregon School of Dentistry, 1926; died February 19; age 73.

Kennedy, I. N., Eustis, Fla.; Southern Dental College, Atlanta, Ga., 1908; died December 23; age 76.

Kennedy, Malcolm G., Levelland, Texas; Texas Dental College; died March 2; age 51.

King, Melvin F., Fort Riley, Kans.; University of Minnesota School of Dentistry, 1930; died February 4; age 53.

King, William V., Greenfield, Mo.; Washington University School of Dentistry, St. Louis, 1905; died March 31; age 75.

Kingsbury, Seward L., Detroit; University of Michigan School of Dentistry, 1913; died March 18; age 66.

Kippel, Saul J., New York; University of Illinois College of Dentistry, 1928; died February 8; age 54.

Klein, Carl, Chicago; Chicago College of Dental Surgery, 1896; died March 1; age 82.

Kline, Albert E., Marysville, Calif.; died January 30,; age 77.

Kline, John C., Cleveland; Western Reserve University School of Dentistry, 1906; died March 6; age 76.

Knoll, Theodore F., Los Angeles; Keokuk Dental College, 1904; died January 12; age 81.

Korte, Robert D., Metropolis, Ill.; Loyola University School of Dentistry, New Orleans, 1946; died January 2; age 34.

Kraft, William P., Philadelphia; Pennsylvania College of Dental Surgery, 1909; died September 26; age 73.

Krygier, Blazius B., Milwaukee; Marquette University Dental School, 1913; died January 10; age 68.

Lacy, Joe Frank, Columbus, Miss.; Birmingham Dental College, 1907; died March 11; age 75.

Landau, Israel M., New York; College of Dental and Oral Surgery, New York, 1908; died January 11; age 79.

Lange, Henry F., Minneapolis; University of Minnesota School of Dentistry, 1910; died January 21; age 75.

Lange, Ralph, Baltimore; Baltimore College of Dental Surgery, 1899; died December 23; age 80.

Lanowitz, Abraham, New York; New York College of Dentistry, 1912; died December 12; age 72.

Lansche, Francis E., Greenville, N. C.; Atlanta-Southern Dental College, 1943; died January 14; age 40.

Lantz, Joseph, Russiaville, Ind.; Indiana Dental College, 1919; died February 27; age 73.

Laskov, Joseph, Chicago; Chicago College of Dental Surgery, 1919; died January 12; age 60.

Lasley, Frank A., Staunton, Va.; Baltimore College of Dental Surgery, 1908; died October 24; age 76.

Last, Benjamin A., Bay City, Mich.; University of Michigan School of Dentistry, 1928; died January 8; age 53.

Laureska, Anthony P., Baltimore; Baltimore College of Dental Surgery, University of Maryland, 1931; died July 26; age 47.

Lehane, James C., Topeka, Kan.; Kansas City Dental College, 1911; died February 4; age 70.

Lehman, Alexander S., Beverly Hills, Calif.; Western Dental College, 1909; died February 5; age 79.

LeMaster, Collins A., University City, Mo.; St. Louis University School of Dentistry, 1915; died March 30; age 65.

Lentz, John A., Phoenix, Ariz.; University of Michigan School of Dentistry, 1896; died January 29; age 82.

Leonard, Harold N., Tigard, Ore.; North Pacific College of Oregon School of Dentistry, 1923; died February 20; age 73.

Leps, Clay W., Charles Town, W. Va.; Baltimore College of Dental Surgery, 1909; died January 29; age 72.

Lewis, George I., Dieterich, Ill.; Barnes Dental College, 1911; died February 13; age 69.

Lillis, James T., Newark, N. J.; University of Pennsylvania School of Dentistry, 1905; died April 5; age 74.

Limenfeld, Samuel, Cliffside Park, N. J.; Medico-Chirurgical College of Philadelphia, 1916; died February 27; age 64.

Lindblad, Harry W., Everett, Wash.; North Pacific College of Oregon School of Dentistry, 1925; died March 8; age 69.

Liner, William H., Waynesville, N. C.; Southeastern Dental University, 1912; died April 2; age 79.

Livingston, Howard J., Fort Collins, Colo.; University of Michigan School of Dentistry, 1896; died October 22; age 84.

Lloyd, Warren E., Toledo, Ohio; Ohio Medical University College of Dentistry, 1905; died January 1; age 73.

Long, George S., Washington, D.C.; New Orleans College of Dentistry, 1903; died March 22; age 74.

Lott, Lucius E., Winter Park, Fla.; Atlanta-Southern Dental College, 1928; died December 30; age 54.

Lynch, Francis H., Dallas, Texas; State Dental College, Dallas, 1912; died March 12; age 69.

Lynn, Samuel E., New York; College of Dental and Oral Surgery, New York, 1919; died January 1; age 60.

Lyon, John L., Lakeview, Ore.; University of Michigan School of Dentistry, 1901; died February 24; age 90.

MacGilvra, Walter V., Worcester, Mass.; University of Minnesota School of Dentistry, 1925; died January 15; age 71.

Maclin, Robert S., Ripley, Tenn.; Vanderbilt University School of Dentistry, 1905; died October 24; age 81.

MacMullen, Fred, Detroit; University of Michigan School of Dentistry, 1908; died January 24; age 75.

Maginnis, Henry H., Mt. Carmel, Pa.; Medico-Chirurgical College of Philadelphia, 1912; died March 6; age 76.

Mahler, Murray S., New York; College of Dental and Oral Surgery, 1919; died February 12; age 60.

Mahowald, Conrad J., Parshall, N. D.; Marquette University Dental School, 1933; died September 2; age 48.

Mann, Joseph, New York; New York College of Dentistry, 1910; died December 22; age 70.

Martens, William G., Sag Harbor, N. Y.; University of Pennsylvania School of Dentistry, 1906; died January 10; age 74.

Martin, James W., Brockton, Mass.; Georgetown University School of Dentistry, 1912; died February 3; age 73.

Martin, Lynn C., Chicago; Chicago College of Dental Surgery, 1915; died December 27; age 66.

Mathers, Frank E., Haddon Heights, N. J.; University of Pennsylvania School of Dentistry, 1911; died February 23; age 69.

Matney, William G., Norfolk, Va.; Baltimore College of Dental Surgery, University of Maryland, 1925; died December 26; age 56.

McCaffrey, James W., Alabama City, Ala.; Southern Dental College, 1912; died February 7; age 80.

McCarty, Ira E., Tulsa, Okla.; Chicago College of Dental Surgery, 1907; died March 2; age 73.

McCracken, Charles M., Port Clinton, Ohio; Ohio Medical University College of Dentistry, 1898; died February 5; age 83.

McKenney, Emerson, Willard, Ohio; Temple University School of Dentistry, 1895; died February 25; age 88.

McMackin, Andrew J., Old Hickory, Tenn.; University of Tennessee College of Dentistry, 1905; died February 4; age 74.

McMahon, James C., Clinton, La.; Loyola University School of Dentistry, New Orleans, 1924; died February 8; age 60.

McOmber, Myron H., Gouverneur, N. Y.; University of Buffalo School of Dentistry, 1914; died October 7; age 72.

Meacham, Forrest W., Chattanooga, Tenn.; Vanderbilt University School of Dentistry, 1900; died January 14; age 81.

Meador, William S., Westmoreland, Tenn.; University of Tennessee College of Dentistry, 1909; died February 19; age 87.

Melcum, Marshall C., Shelton, Wash.; North Pacific College of Oregon School of Dentistry, Portland, 1919; died December 25; age 63.

Mendel, Walter E., Pittsburgh; University of Pittsburgh School of Dentistry, 1905; died February 5; age 77.

Miller, Peter W., Champaign, Ill.; Indiana Dental College, 1901; died February 26; age 80.

Miller, Samuel C., New York; New York College of Dentistry, 1925; died February 8; age 54.

Minn, Louis L., Waukegan, Ill.; Indiana University School of Dentistry, 1925; died November 12; age 66.

Mitchell, Isadore C., Los Angeles; Howard University College of Dentistry, 1925; died January 25; age 64.

Moeller, Frank R., Detroit; Northwestern University Dental School, 1910; died January 12; age 71.

Molina, Fernando A., Lansing, Mich.; University of Michigan School of Dentistry, 1944; died January 31; age 37.

Moore, Arthur R., Naperville, Ill.; Northwestern University Dental School, 1915; died November 24; age 66.

Morgan, Lemuel J., East Stroudsburg, Pa.; Pennsylvania College of Dental Surgery, 1899; died February 9; age 80.

Morrison, Martin H., Cleveland; Western Reserve University School of Dentistry, 1897; died February 17; age 85.

Mosher, Donald F., Charleston, W. Va.; University of Pennsylvania School of Dentistry, 1899; died January 20; age 84.

Moss, Robert W., Richmond, Va.; Medical College of Virginia School of Dentistry, 1929; died February 6; age 52.

Munger, Milo W., Mount Pleasant, Iowa; University of Iowa, College of Dentistry, 1904; died December 10; age 80.

Musser, Cloyd M., Fairmont, W. Va.; Chicago College of Dental Surgery, 1918; died February 8; age 67.

Newgord, Harry C., Ely, Minn.; University of Minnesota School of Dentistry, 1905; died January 2; age 74.

Newman, Allan O., Berkeley, Calif.; University of California College of Dentistry, 1924; died February 27.

Newman, Morris B., New York; Columbia University School of Dental and Oral Surgery, 1924; died February 20; age 60.

Nimocks, William G., Fayetteville, N. C.; Atlanta-Southern Dental College, 1918; died February 16; age 62.

Olson, Theodore N., Grand Forks, N. D.; Chicago College of Dental Surgery, 1927; died March 6; age 54.

Osborne, Edward O., Albany, Wis.; Marquette University Dental School, 1926; died February 24; age 67.

Pearson, Thomas H., Port Richmond, N. Y.; New York College of Dentistry, 1915; died February 11; age 67.

Peden, Thomas R., Laguna Beach, Calif.; University of Southern California School of Dentistry, 1912; died March 9; age 70.

Perlin, Maurice M., Chicago; Temple University School of Dentistry; died February 23; age 72.

Phillips, William H., Wilson, N. C.; died October 26; age 65.

Munkelwitz, Norman Ralph, Sonyea, N. Y.; Columbia University School of Dental and Oral Surgery, 1928; died January 20; age 61.

Murray, Alexander J., Denver; University of Denver School of Dentistry, 1909; died November 25; age 87.

Needham, Thomas W., Marathon, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1910; died October 7; age 68.

Newton, Rollin A., Massena, N. Y.; University of Buffalo School of Dentistry, 1900; died August 30; age 78.

Ogden, Terrell R., Memphis, Tenn.; University of Tennessee College of Dentistry, 1914; died January 18; age 68.

Parker, William, Elizabeth City, N. C.; University College of Medicine Dental Department, Richmond, Va., 1909; died November 10; age 71.

Parks, George A., Yuma, Colo.; Northwestern University Dental School, 1900; died December 4; age 84.

Patzold, Emil R., Waterbury, Conn.; Pennsylvania College of Dental Surgery, 1891; died January 22; age 86.

Pearson, Townsend A., Perry, Iowa; Northwestern University Dental School, 1911; died October 6; age 71.

Peebles, William W., Omaha; Chicago College of Dental Surgery, 1906; died January; age 77.

Phelps, George H., Canton, Ohio; Western Reserve University School of Dentistry, 1910; died January 8; age 73.

Pierce, Charles F., Wilmington, Del.; Medico-Chirurgical College of Philadelphia, 1900; died January 16; age 87.

Pollock, Charles V., Ironton, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1904; died October 18; age 82.

Pollock, David G., Brooklyn; College of Dental and Oral Surgery, 1904; died August 29; age 82.

Ponte, Franco, New York; died February 14; age 78.

Pope, Robert R., Union, S. C.; Southern Dental College, Atlanta, Ga., 1915; died January 13; age 66.

Powell, William B., Chicago; died October 19; age 88.

Pressl, Frederick C., Larned, Kan.; Western Dental College, 1913; died February 9; age 71.

Psayla, Joseph E., New Orleans; Southern Dental College, 1905; died February 6; age 72.

Quirk, Thomas K., Laguna Beach, Calif.; University of Southern California School of Dentistry, 1939; died January 28; age 50.

Radder, Louis W., Rochester, N. Y.; University of Buffalo School of Dentistry, 1926; died January 17; age 61.

Redmond, William L., Jacksonville, Fla.; Meharry Medical College School of Dentistry, 1926; died December 30; age 65.

Reed, Kenneth C., Wheat Ridge, Colo.; University of Minnesota School of Dentistry, 1916; died October 16; age 67.

Reed, Smith Warren, Margaretville, N. Y.; University of Pennsylvania School of Dentistry, 1905; died February 27; age 78.

Reischauer, Ernest F., Chicago; Chicago College of Dental Surgery, 1909; died November 1; age 80.

Reser, Horace P., Weaubleau, Mo.; Western Dental College, 1914; died January 20; age 68.

Resnick, Simon, New York; College of Dental and Oral Surgery; New York, 1922; died December 12; age 63.

Rice, Clifton M., Oak Park, Mich.; University of Michigan School of Dentistry, 1916; died December 20; age 77.

Ricker, John R., Houston, Texas; University of Pennsylvania School of Dentistry, 1893; died January 7; age 87.

Ries, Isaac P., Brooklyn; New York College of Dentistry, 1914; died December 27; age 64.

Romine, Harry Leo, Morristown, N. J.; University of Pennsylvania School of Dentistry, 1918; died February 22; age 62.

Rosen, Bernard S., Oakland, Calif.; University of California College of Dentistry, 1919; died February 28; age 59.

Rosenblum, Abraham H., New York; New York College of Dentistry, 1913; died October 16; age 69.

Rowe, Walter E., Springfield, Mass.; Boston Dental College, 1895; died January 18; age 82.

Ruderman, Sidney L., New York; New York University College of Dentistry, 1935; died February 26; age 46.

Rybeck, William H. Jr., Meriden, Conn.; University of Pennsylvania School of Dentistry, 1951; died February 5; age 31.

Samuels, Harvey C., Minneapolis; University of Minnesota School of Dentistry, 1910; died January 18; age 68.

Schecter, Sol, New York; New York College of Dentistry, 1918; died February 4; age 61.

Schottler, Jacob G., Milwaukee; Milwaukee Medical College Dental Department, 1898; died March 14; age 79.

Schwartz, Leon I., Jamaica, N. Y.; New York College of Dentistry, 1916; died December 27; age 62.

Seay, Earl M., Fayetteville, W. Va.; Ohio College of Dental Surgery, University of Cincinnati, 1925; died February 17; age 56.

Sellett, L. C., La Salle, Ill.; St. Louis University School of Dentistry, 1926; died March 1; age 64.

Shields, Idus W., Miami, Fla.; Southern Dental College, 1916; died February 21; age 70.

Short, George T., Kansas City, Mo.; Kansas City Dental College, 1901; died February 11; age 81.

Siddor, Benjamin, Brooklyn; Columbia University School of Dental and Oral Surgery, 1924; died February 15; age 57.

Sigtenhorst, William, Blue Island, Ill.; Chicago College of Dental Surgery, 1913; died March 3; age 79.

Slattery, Frederick P., Fitchburg, Mass.; Philadelphia Dental College, 1905; died March 19; age 76.

Sniffen, Charles P., White Plains, N. Y.; New York College of Dentistry, 1903; died March 4; age 76.

Sobierajski, Casimir, Chicago; Chicago College of Dental Surgery, 1930; died December 19; age 50.

Soffin, Rubin J., Forest Hills, N. Y.; New York University College of Dentistry, 1927; died December 28; age 54.

Sommers, Hilmar F., Baltimore; University of Pittsburgh School of Dentistry, 1910; died April 2, 1957; age 76.

Spencer, Bradford J., Oklawaha, Fla.; Tufts College Dental School, 1919; died February 19; age 67.

Stevenson, Ralph E., Camden, S. C.; Vanderbilt University School of Dentistry, 1913; died December 18; age 68.

Stillman, Earl M., Rochester, N. Y.; University of Buffalo School of Dentistry, 1918; died March 2; age 63.

Stockwell, John D., Milwaukee; Chicago College of Dental Surgery, 1909; died February 23; age 73.

Sturdevant, Preston J., Forty Fort, Pa.; University of Pennsylvania School of Dentistry, 1918; died January 25; age 61.

Sweet, Arthur M., Essex, Conn.; University of Michigan School of Dentistry, 1898; died February 21; age 87.

Taylor, Joseph A., Eldon, Mo.; died February 7; age 82.

Teters, Daniel S., Bryan, Ohio; Western Reserve University School of Dentistry, 1909; died February 10; age 71.

Tharp, Bealor R., Springfield, Mo.; Western Dental College, 1914; died January 19; age 72.

Thomas, Herbert M., Kansas City, Mo.; Baltimore College of Dental Surgery, 1903; died March 4; age 79.

Thomas, Morgan L., Tampa, Fla.; Atlanta Dental College, 1908; died February 5; age 76.

Troupe, Attrell B., Kansas City, Mo.; Meharry Medical College School of Dentistry, 1916; died January 5; age 64.

Tschappat, John F., Dayton, Ohio; Ohio State University College of Dentistry, 1924; died February 26; age 61.

Uelmen, Nick E., Milwaukee; Marquette University Dental School, 1911; died February 1; age 72.

Vanderzone, George, Ventura, Calif.; University of Denver School of Dentistry, 1928; died January 13; age 59.

Van Proyen, Leon, Weaverville, N. C.; Indiana University School of Dentistry, 1927; died February 13; age 61.

Veith, Rudolph C., Tacoma, Wash.; North Pacific College of Oregon School of Dentistry, Portland, 1919; died January 2; age 67.

Voreck, Wallace E., Charles City, Iowa; University of Iowa College of Dentistry, 1915; died January 12; age 65.

Watts, Ernest D., Geneseo, Ill.; Chicago College of Dental Surgery, 1907; died January 29; age 73.

Weigert, Robert E. Lee, Queens Village, N. Y.; died March 15; age 83.

Weiss, Reno, Seattle; Wisconsin College of Physicians and Surgeons, Department of Dental Surgery, 1903; died January 2; age 82.

White, Archibald K., Morgan City, La.; Tulane University School of Dentistry, New Orleans, 1910; died February 11; age 74.

Wieland, Gilbert H., Hastings, Neb.; University of Nebraska College of Dentistry, 1933; died January 30; age 52.

Wilson, Carl R., Silverton, Ore.; North Pacific College of Oregon School of Dentistry, 1919; died March 9; age 61.

Wilson, Reginald G., Philadelphia; Temple University School of Dentistry, 1908; died February 8; age 70.

Wingrove, Alonzo C., Auburn, Wash.; University of Maryland Dental Department, 1909; died December 1; age 75.

Wolfe, George M., Eudora, Kan.; Western Dental College, 1902; died January 17; age 82.

Wolford, Ralph M., Johnstown, Pa.; Medico-Chirurgical College of Philadelphia, 1916; died February 28; age 64.

Young, George W., Harrisburg, Pa.; Baltimore College of Dental Surgery, 1923; died February 24; age 62.

Yule, David D., Lawrence, Mass.; Tufts College Dental School, 1923; died March 5; age 67.

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Pedodontics: Francis W. Summers, 662 S. Western Ave., Los Angeles

Periodontics: Erwin M. Schaffer, Medical Arts Bldg., Minneapolis

Practice Administration: Jay H. Eshleman, 6414 Germantown Ave., Philadelphia

Prosthodontics, Complete: K. Paul Ramsay, 9615 Brighton Way, Beverly Hills, Calif.

Prosthodontics, Partial: George E. Emig, 3900 Reservoir Road, N.W., Washington, D.C

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Roentgenology: Arthur H. Wuehrmann, School of Dentistry, University of Alabama, Birmingham, Ala.

THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION

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Announcements

MEETINGS OF THE AMERICAN DENTAL ASSOCIATION

Ninety-Ninth Annual Session	Nov. 10-13, 1958	Dallas, Texas
One-Hundredth Annual Session	Sept. 14-18, 1959	New York
One-Hundred and First Annual Session	Oct. 17-20, 1960	Los Angeles
One-Hundred and Second Annual Session	Oct. 16-19, 1961	Philadelphia

MEETINGS OF CONSTITUENT SOCIETIES

State	Date	Place	Secretary	Address
Alabama	Apr. 19-22, 1959	Birmingham	C. R. Crook	Professional Center, Montgomery
Alaska			C. L. Polley	Box 1896, Juneau
Arizona			W. G. Burke	15 E. Monroe St., Phoenix
Arkansas	Apr. 12-15, 1959	Little Rock	D. M. Hamm	Box 89, Clarksville
California	Apr. 20-22, 1959	San Francisco	W. J. Healy	518 Sutter St., San Francisco 8
S. California	May 4-6, 1959	Los Angeles	S. M. Silverman	903 Crenshaw Blvd., Los Angeles 19
Colorado	Oct. 5-8	Colorado Springs	G. H. Jackson	724 Republic Bldg., Denver
Connecticut	May 13, 14, 1959	Hartford	E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware			E. J. Truono	1102 S. Broom St., Wilmington 4
District of Columbia	Mar. 15-18, 1959	Washington	J. F. Keaveny	1029 Vermont Ave., N.W., Washington
Florida	May 17-20, 1959	Hollywood	R. P. Groom	3127 Atlantic Blvd., Jacksonville
Georgia	Oct. 12-15	Atlanta	F. M. Butler, Jr.	Bankers Insurance Bldg., Macon
Hawaii	June 14-18, 1959	Honolulu	J. H. Dawe	810 N. Vineyard St., Honolulu
Idaho	June 22-24, 1959	McCall	J. R. Olesberg	214 Third St., Coeur d'Alene
Illinois	May 11-13, 1959	Peoria	P. W. Clopper	632 Jefferson Bldg., Peoria
Indiana	May 18-20, 1959	Indianapolis	W. R. Shoemaker	Citizens Bank Bldg., Anderson
Iowa	May 3-6, 1959		H. I. Wilson	Insurance Exchange Bldg., Des Moines
Kansas	Apr. 26-29, 1959	Topeka	F. A. Richmond	Brotherhood Bldg., Kansas City 1
Kentucky	Apr. 5-8, 1959	Louisville	A. B. Coxwell, Jr.	2208 Dundee Rd., Louisville 5
Louisiana	Apr. 1-4, 1959	Shreveport	J. S. Bernhard	2515 Line Ave., Shreveport
Maine	June 18-20, 1959	Rockland	S. M. Gower	Box 27, Skowhegan
Maryland	May 3-6, 1959	Baltimore	C. L. Inman, Jr.	Medical Arts Bldg., Baltimore
Massachusetts	May 3-6, 1959	Boston	H. E. Tingley	12 Bay State Rd., Boston 15
Michigan	Apr. 20-22, 1959	Grand Rapids	F. Wertheimer	Michigan Dept. of Health Lansing
Minnesota	Apr. 13-15, 1959	Minneapolis	C. V. E. Cassel	2236 Marshall Ave., St. Paul 4
Mississippi			B. A. Cohen	Box 9981, Jackson 27
Missouri	May 10-13, 1959	Springfield	E. D. Suggett	Merchants Bank Bldg., Jefferson City
Montana	May 7-9, 1959	Kalispell	R. C. Ritter	28 N. Black St., Bozeman
Nebraska	Apr. 26-29, 1959	Lincoln	F. A. Pierson	Federal Securities Bldg., Lincoln
Nevada	May 10-12, 1959	Las Vegas	O. M. Seifert	755 Ryland Ave., Reno
New Hampshire	June 21-24, 1959	Whitefield	F. E. Williams	814 Elm St., Manchester
New Jersey	May 12-15, 1959	Atlantic City	J. G. Carr	407 Cooper St., Camden
New Mexico	June 7-10, 1959	Santa Fe	W. A. Blueher	24 Medical Arts Sq., N. E., Albuquerque
New York	May 10-13, 1959	Syracuse	C. A. Wilkie	1 Hanson Pl., Brooklyn 17

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State	Date	Place	Secretary	Address
North Carolina	May 3-6, 1959	Pinehurst	L. H. Butler	Jefferson Bldg., Greensboro
North Dakota	May 3-6, 1959	Grand Forks	J. H. Pfister	419½ Dakota Ave., Wahpeton
Ohio	Sept. 28-Oct. 1	Cincinnati	E. G. Jones	185 E. State St., Columbus
Oklahoma	Apr. 26-29, 1959	Tulsa	L. D. Wright	Oelec Bldg., Oklahoma City
Oregon	Mar. 2-4, 1959	Portland	T. D. Holder	Selling Bldg., Portland
Panama Canal Zone			G. E. Lilly	Box 29, Ft. Clayton
Pennsylvania	May 13-16, 1959	Harrisburg	M. D. Zimmerman	217 State St., Harrisburg
Puerto Rico	Jan. 1959	San Juan	J. E. Munoz	Box 9023, Santurce
Rhode Island	Jan. 20, 21, 1959	Providence	H. A. McGuirl	Union Trust Bldg., Providence
South Carolina	May 24-26, 1959	Charleston	J. E. Wallace	1506 Gregg St., Columbia
South Dakota	May 31-June 2, 1959	Rapid City	R. E. Decker	Box 308, Parker
Tennessee	May 11-14, 1959	Nashville	K. P. Exell	116 N. Academy, Murfreesboro
Texas	May 3-6, 1959	San Antonio	C. A. McMurray	3707 Gaston Ave., Dallas 10
Utah			R. C. Dalgleish	State Capitol Bldg., Salt Lake City
Vermont			E. H. Van Santvoord	22 Washington St., Rutland
Virginia	Apr. 8-11, 1959	Roanoke	W. T. McAfee	Colonial National Bank Bldg., Roanoke
Washington	April 6-8, 1959	Seattle	G. D. Dore, Jr.	211 Medical Dental Bldg., Seattle 1
West Virginia	July 20-23		G. N. Casto, Jr.	710½ Lee St., Charleston
Wisconsin	Apr. 27-29, 1959	Milwaukee	C. J. Baumann, Jr.	606 W. Wisconsin Ave., Milwaukee
Wyoming			T. J. Drew	State Office Bldg., Cheyenne

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	Date	Place	Secretary	Address
Alabama			W. L. McCarty	Professional Center, Montgomery
Alaska			R. H. Williams	Box 2122, Juneau
Arizona			W. G. Biddulph	1502 W. Osborn Rd., Phoenix
Arkansas			W. T. Jones	107 E. Shelton, Monticello
California			D. R. Grant	507 Polk St., San Francisco
Colorado			R. F. Gilmore	Republic Bldg., Denver 2
Connecticut			C. G. Brooks	302 State St., New London
Delaware			P. K. Musselman	143 W. Main St., Newark
District of Columbia			W. T. Birthright	1835 Eye St., N.W., Washington
Florida			R. P. Taylor, Jr.	P. O. Box 2913, Jacksonville 3
Georgia	June 8-10 1959*†	Atlanta	W. G. Brown	Blackshear
Hawaii	Aug. 28-Sept. 1‡		J. Y. Ing	James Campbell Bldg., Honolulu
Idaho			A. G. DeWinter	Sun Bldg., Boise
Illinois			W. A. McKee	Wood Bldg., Benton
Indiana	Dec. 8-11*†	Indianapolis	C. A. Frech	Gary National Bank Bldg., Gary
Iowa			P. A. Hahn	Farmers & Merchants Bank Bldg., Burlington
Kansas			G. L. Teall	Box 71, Hiawatha
Kentucky			J. J. Kelly	102 W. Madison St., Franklin
Louisiana			R. C. Steib	Maison Blanche Bldg., New Orleans
Maine			A. S. Appleby	Box 260, Skowhegan
Maryland			W. D. Burton	829 Park Ave., Baltimore 1
Massachusetts			C. R. Williams	70 Washington St., Salem
Michigan	Jan. 18-24 June 7-13, 1959*†	Ann Arbor	J. L. Champagne	3714 W. McNichols Rd., Detroit 21
Minnesota			E. A. Nelson	2236 Marshall Ave., St. Paul 4 W
Mississippi	Jan. 5-7, 1959*†‡		A. H. Richter, Jr.	Aven Bldg., Greenwood
Missouri			R. R. Rhoades	Central Trust Bldg., Jefferson City
Montana			R. O. Betzner	303 Power Block, Helena
Nebraska			H. E. Weber	Stuart Bldg., Lincoln
Nevada	Dec. 7	Reno	R. Whitehead	40 W. First St., Reno
New Hampshire			S. G. Markos	8 Renaud Ave., Dover

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State	Date	Place	Secretary	Address
New Jersey			C. J. Schweikhardt	150 E. State St., Trenton 8
New Mexico			J. J. Clarke, Sr.	Artesia
New York	Dec. 2-5, 8, 9*‡		D. W. Beier	23 S. Pearl St., Albany 7
North Carolina			J. H. Guion	Doctors Bldg., Charlotte 7
North Dakota			G. F. Wirtz	Clinic Bldg., Mandan
Ohio			D. E. Bowers	322 E. State St., Columbus 15
Oklahoma			W. H. Stephens	Plaza Court Bldg., Oklahoma City
Oregon	Dec. 8-11*†	Portland	F. L. Utter	Pioneer Trust Bldg., Salem
Pennsylvania			R. E. V. Miller, Sr.	Dept. of Public Instruction, Box 911, Harrisburg
Puerto Rico			J. Mercado C.	Comercio St. #452, San Juan
Rhode Island			F. M. Hackett	267 Academy Ave., Providence
South Carolina			W. J. Brockington	1508 Washington St., Columbia 1
South Dakota			H. T. Aker	Canton
Tennessee			C. R. Aita	Bennie-Dillon Bldg., Nashville
Texas	Oct. 8-12* Oct. 10-12†	Houston	R. T. Weber	Capitol National Bank Bldg., Austin 16
Utah			M. T. Rigby	47 E. Center St., Midvale
Vermont			P. M. Fitch	Newport
Virginia			J. M. Hughes	Medical Arts Bldg., Richmond
Washington			F. S. Rotchford	1108 S. Washington St., Olympia
West Virginia			C. C. Cottrill	Box 111, Glen Rogers
Wisconsin			S. F. Donovan	Tomah
Wyoming			E. E. Edwards	Bank of Commerce Bldg., Sheridan

Most states require applications to be in 30 days prior to examination date.
*Dental examination. †Dental hygiene examination. ‡Write to secretary of dental examining board for information on locations of examinations.

MEETINGS OF OTHER ORGANIZATIONS

Name	Date	Place	Secy. or Chm.	Address
Academy of Dentistry for the Handicapped	Feb. 8, 1959	Chicago	R. Kaplan Secy.	3038 Federal St., Camden, N. J.
American Academy of Crown and Bridge Prosthodontics	Feb. 7, 8, 1959	Chicago	W. E. Corry Secy.	2165 Adelbert Rd., Cleveland 6
American Academy of Dental Practice Administration	Feb. 5, 6, 1959	Chicago	R. H. Campbell Secy.	18595 Grand River Ave., Detroit 23
American Academy of Gold Foil Operators	Nov. 7, 8,	Dallas	C. C. Latham Secy.	1125 Tenth St., Coronado, Calif.
American Academy of the History of Dentistry	Nov. 7	Dallas	M. B. Asbell Secy.	25 Haddon Ave., Camden, N. J.
American Academy of Implant Dentures	Nov. 7-9	Dallas	A. N. Cranin Secy.	2120 Ocean Ave., Brooklyn 29
American Academy of Maxillofacial Prosthetics	Feb. 4-6, 1959	Chicago	H. C. Sullivan Secy.	1516 Wealthy St., S. E., Grand Rapids 6, Mich.
American Academy of Oral Roentgenology	Nov. 7, 8	Dallas	T. S. Grant Secy.	508 16th St., Oakland, Calif.
American Academy of Pedodontics	Aug. 28-30	St. Louis	W. E. Cody Secy.	1325 E. 16th Ave., Denver
American Academy of Periodontology	Nov. 6-8	Dallas	C. E. Chamberlain Secy.	1101 N. North St., Peoria, Ill.
American Academy of Restorative Dentistry	Feb. 7, 8, 1959	Chicago	M. H. Mortonson, Jr. Secy.	735 N. Water St., Milwaukee 2
American Association for the Advancement of Science, Section on Dentistry	Dec. 29	Washington, D. C.	R. W. Bunting Secy.	University of Michigan School of Dentistry, Ann Arbor, Mich.
American Association of Dental Editors	Nov. 9	Dallas	A. H. Kutscher Secy.	400 N. 8th Ave., Highland Park, N.J.
American Association of Dental Examiners	Nov. 7, 8	Dallas	G. L. Teall Secy.	Box 71 Hiawatha, Kan.
American Association of Dental Schools	Nov. 9	Dallas	M. W. McCrea Secy.	School of Dentistry, University of Minnesota, 127 Owre Hall, Minneapolis
American Association of Endodontists	Feb. 6-8, 1959	Chicago	V. B. Milas Secy.	2559 W. 63rd St., Chicago 29

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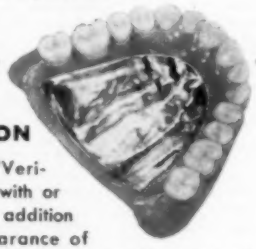

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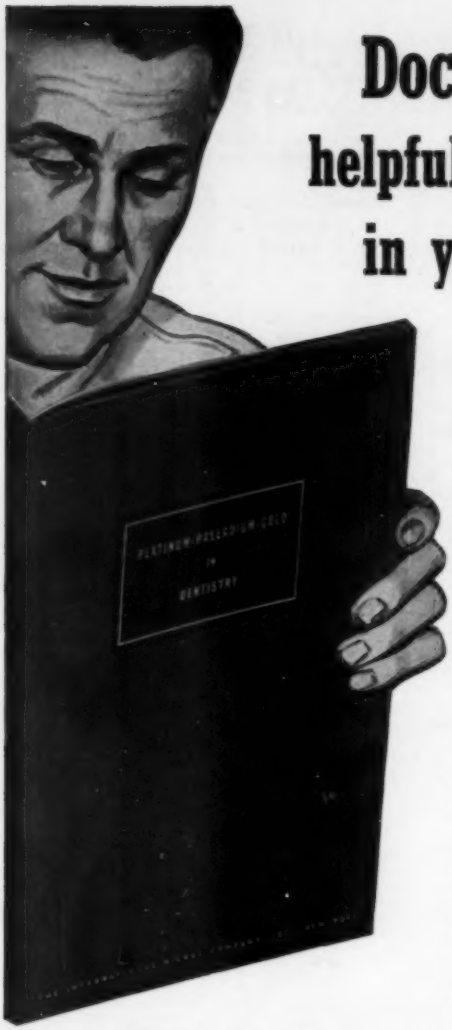
Name	Date	Place	Secy. or Chm.	Address
American Association of Public Health Dentists	Nov. 8	Dallas	P. Ayres Secy.	Box 2591, Jefferson County Dept. of Health, Birmingham, Ala.
American Board of Dental Public Health	Nov. 6, 7	Dallas	C. V. Tossy Secy.	Michigan Dept. of Health Lansing, Mich.
American Board of Oral Pathology	Dec. 6, 7		D. A. Kerr Secy.	University of Michigan, School of Dentistry, Ann Arbor, Mich.
American Board of Oral Surgery	Aug. 2 Dec. 1 Apr. 2-6, 1959	Chicago Chicago	L. M. FitzGerald Secy.	Roshek Bldg., Dubuque, Iowa
American College of Dentists	Nov. 9	Dallas	O. W. Brandhorst Secy.	4221 Lindell Blvd., St. Louis
American Dental Assistants Association	Nov. 10-13	Dallas	M. L. Martin Exec. Secy.	First National Bank Bldg., La Porte, Ind.
American Dental Assistants Certification Board	Oct. 8		F. Smith	23 W. 33 St., Bayonne, N.J.
American Dental Hygienists' Association	Nov. 10-13	Dallas	M. E. Swanson Exec. Secy.	100 E. Ohio St., Chicago
American Dental Society of Anesthesiology	Nov. 8, 9	Dallas	H. A. Sultz Secy.	249 Linwood Ave., Buffalo
American Denture Society	Nov. 7, 8	Dallas	V. L. Steffel Secy.	College of Dentistry, Ohio State University, Columbus, Ohio
American Institute of Dental Medicine	Oct. 12-16	Palm Springs, Calif.	M. Lewis Exec. Secy.	2240 Channing Way, Berkeley 4, Calif.
American Society for the Advancement of General Anesthesia in Dentistry	Oct. 27	New York	M. H. Feldman Exec. Secy.	730 Fifth Ave., New York 19
American Society of Dentistry for Children	Nov. 7-9	Dallas	R. E. McDonald Secy.	School of Dentistry, Indiana University, 1121 W. Michigan St., Indianapolis
Ark-La-Tex Dental Congress	Aug. 18	Shreveport, La.	J. Wyrick Secy.	Texarkana National Bank, Texarkana, Texas
Association of American Women Dentists	Nov. 10	Dallas	M. B. McCann Secy.	2600 N. McCullough, San Antonio, Texas
Australian Dental Congress (Fifteenth)	Feb. 23-27, 1959	Adelaide, So. Australia	M. J. Barrett Secy.	51 Grenfell St., Adelaide, So. Australia
Austrian Dental Association	Sept. 18-21	Salzburg, Austria	K. Czerwenka	Franz Josef Strasse 12, Salzburg, Austria
Canadian Dental Association	Oct. 26-29	Montreal	D. W. Gullett Secy.	234 St. George St., Toronto 5, Canada
Chicago Dental Society	Feb. 8-11, 1959	Chicago	K. S. Richardson Exec. Secy.	30 N. Michigan Ave., Chicago
Congress of Stomatologists of Yugoslavia (Second)	Sept. 18-20	Beograd, Yugoslavia	P. Stosic Secy.	Stomatoloski fakultet, Beograd, Rankeova 4, Yugoslavia
Council on Dental Education, Dental Aptitude Tests	Oct. 3, 4		S. Peterson Secy.	222 E. Superior St., Chicago 11
Cuban National Dental Congress (Fifth)	Mar. 29-31, 1959	Havana	C. Funcia C.	No. 353, Vedado, Havana, Cuba
Dallas Mid-Winter Dental Clinic (Thirty-second)	Jan. 25-28, 1959	Dallas, Texas	M. Thornton Gen. Chm.	2921 Fairmount Dallas, Texas
Denver Dental Association	Jan. 11-14, 1959	Denver	W. D. McCarthy Secy.	Republic Bldg., Denver 2
Detroit District Dental Society	Nov. 24, 25	Detroit	S. Silverman Chm.	6426 Van Dyke Ave., Detroit 13
Federation Dentaire Internationale, 46th Annual Meeting	Aug. 27-Sept. 3	Brussels, Belgium	G. H. Leatherman Secy.	35 Devonshire Pl., London W.1, England
German Dental Society	Sept. 4-7	Dusseldorf	K. Winter	Duisburgerstrasse 42, Dusseldorf, Germany
Greater New York Dental Meeting (Thirty-fourth)	Dec. 8-12	New York	M. Purdy Exec. Secy.	Statler Hotel, New York 1
International College of Dentists	Nov. 9	Dallas	H. O. Westerdahl Secy.	4829 Minnetonka Blvd., Minneapolis
International Dental Congress of Chile (Fourth)	Nov. 16-22	Santiago, Chile	J. C. Montandon Pres.	Sociedad Odontologica de Chile, Casilla 2575, Santiago, Chile



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Name	Date	Place	Secy. or Chm	Address
International Dental Meeting of Paris (Thirty-second)	Nov. 24-30	Paris, France	R. A. Robert Gen. Secy.	10, rue de l'Isly, Paris 8, France
Italian Society of Dentistry and Maxillofacial Surgery	Sept. 3-7	Pavia, Italy	S. Palazzi Dir.	Clinica Odontoiatrica, Universita di Pavia, Pavia, Italy
Mid-Continent Dental Congress	Oct. 12-15	St. Louis	J. E. Brophy Exec. Secy.	8013 Maryland Ave., Clayton 5, Mo.
Midwest Society of Periodontology	Feb. 7, 8, 1959	Chicago	G. Roth Secy.	University of Kansas City, School of Dentistry, 1108 E. Tenth St., Kansas City 6, Mo.
Mississippi Conference on Periodontia and Dental Medicine	Aug. 13, 14	University, Miss.	D. C. Trexler Dir.	Dept. Conferences, Institutes, and Short Courses, University of Mississippi, University Extension, University, Miss.
National Association of Seventh Day Adventist Dentists	Nov. 7-9	Dallas	G. H. Curtis Secy.	Medical College of Evangelists, Dental School, Loma Linda, Calif.
National Board of Dental Examiners	Dec. 1, 2		G. J. Casey Secy.	222 E. Superior St., Chicago 11
National Dental Association, Inc.	Aug. 3-7	Pittsburgh	E. N. Jackson Secy.	P. O. Box 197 Charlottesville, Va.
New England Dental Society	Oct. 21, 22	Boston	W. F. O'Meara Secy.	904 Main St., Hartford, Conn.
New Orleans Dental Conference (Eleventh)	Nov. 23-26	New Orleans	A. A. Copping Secy.	4704 Paris Ave., New Orleans
Northeastern Society of Orthodontists	Nov. 3, 4	Montreal, Canada	D. Mossberg Secy.	36 Central Park S. New York
Odontological Federation of Central America and Panama, Second International Convention	Nov. 26-29	San Jose, Costa Rica	R. Chartier Chm.	P. O. Box 698, San Jose, Costa Rica, C.A.
Odontological Society of Western Pennsylvania	Sept. 30-Oct. 2	Pittsburgh	H. D. Butts, Jr. Secy.	Jenkins Bldg., Pittsburgh 22
Pan-American Dental Congress	Nov. 18-22	Mexico City, Mexico	R. E. Woodworth For. Secy.	Asociacion Dental Mexicana, Sinaloa 9, Mexico 7, D. F., Mexico
Pan American Odontological Association	Dec. 10	New York	R. H. Brodsky Exec. Secy.	14 E. 81st St., New York
Rumanian Stomatological Congress	Dec.		N. Herman Secy.	Section de Stomatologie de la Societe des Sciences Medicales de la Republique Populaire Roumaine, Str. Progresuliu 8, Bucharest, Rumania
Sao Paulo, Brazil, International Dental Meeting	Sept. 14-20	Sao Paulo, Brazil	J. Hildebrando T. Secy.	126 Avenida Sao Joao, Sao Paulo, Brazil

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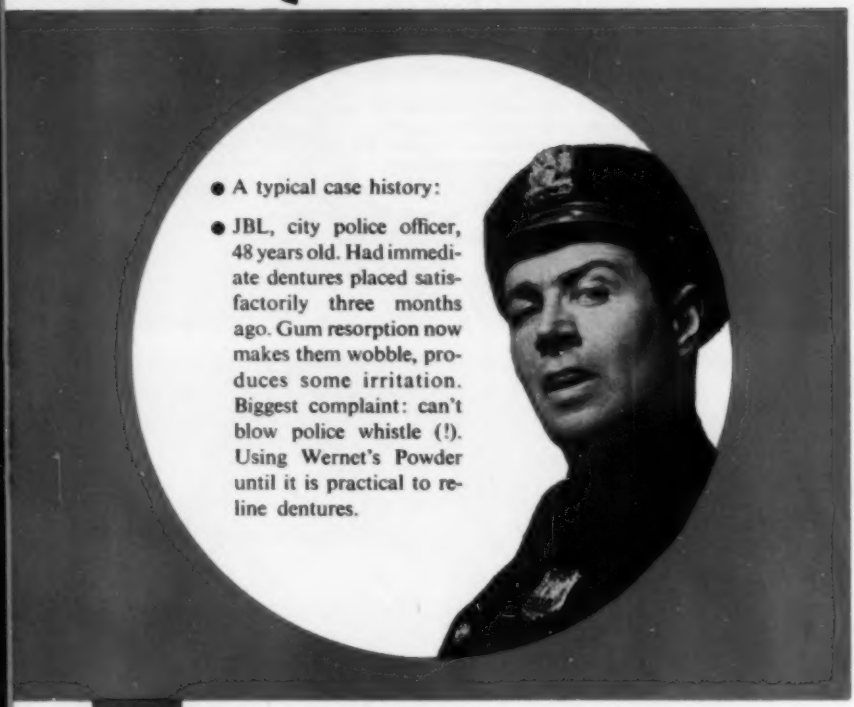

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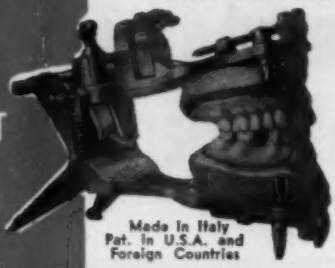

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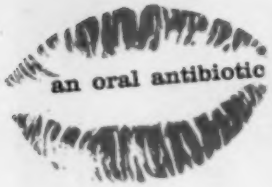

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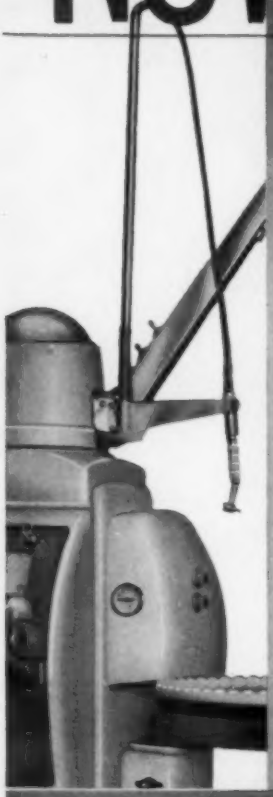

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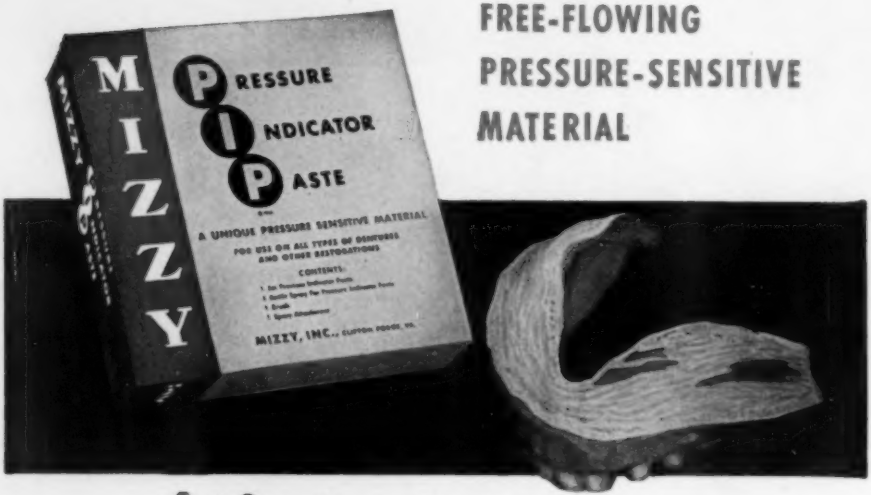

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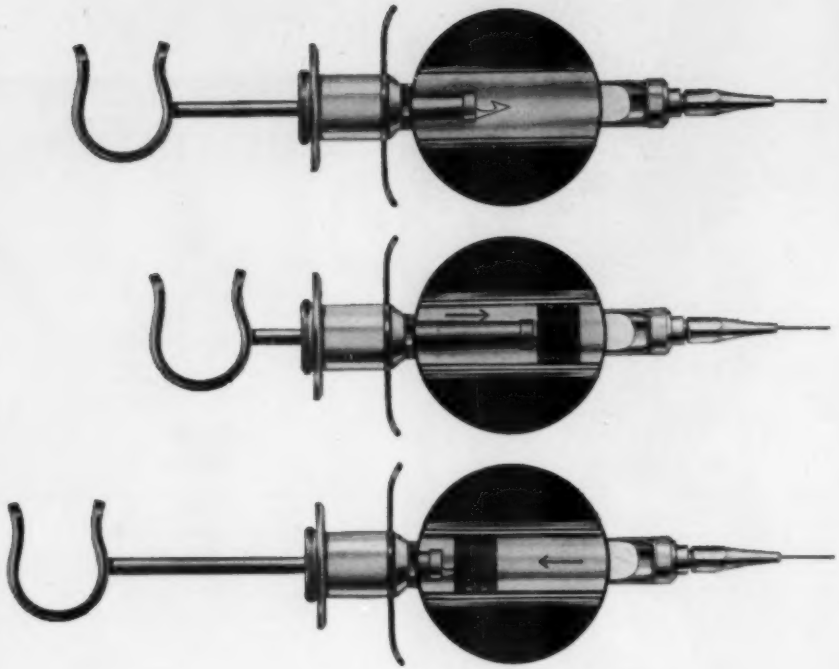

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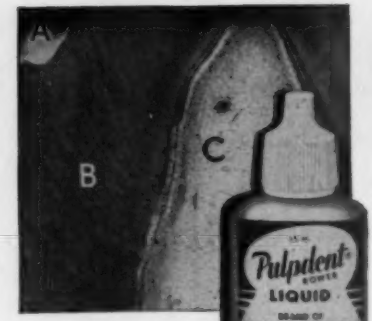

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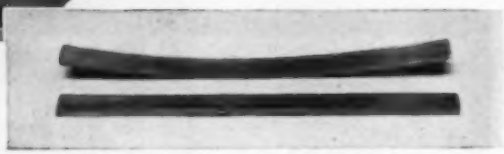

This shows why castings frequently warp. The upper bar was descaled by sandblasting; the other by Liquid Honing.

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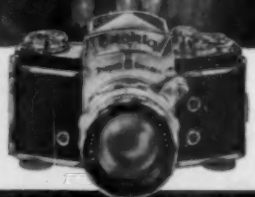

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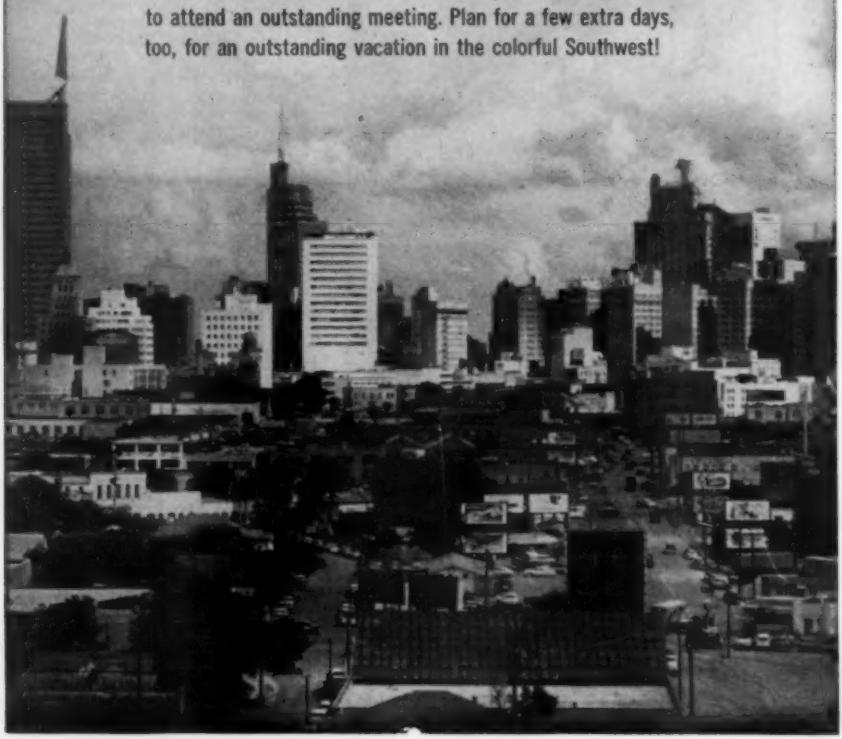

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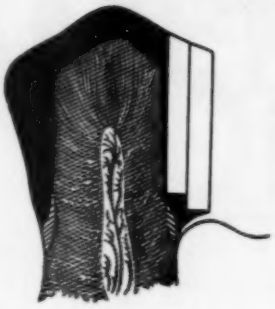

FIG. 1

Proper placement of the recess which is prepared in the abutment tooth to receive the attachment is achieved by careful preliminary planning on the study model.

In figure 1, the recess has not been made deep enough to accommodate the attachment within the normal contour of the tooth. A gingival shelf is created which is unhygienic and destructive to the investing tissue. The mesio-distal dimension is also increased which results in unfavorable leverage on the abutment tooth.

FIG. 2

Figure 2 illustrates the correct placement of the attachment within the confines of the abutment tooth, thus allowing enough room for the development of proper tooth contour.

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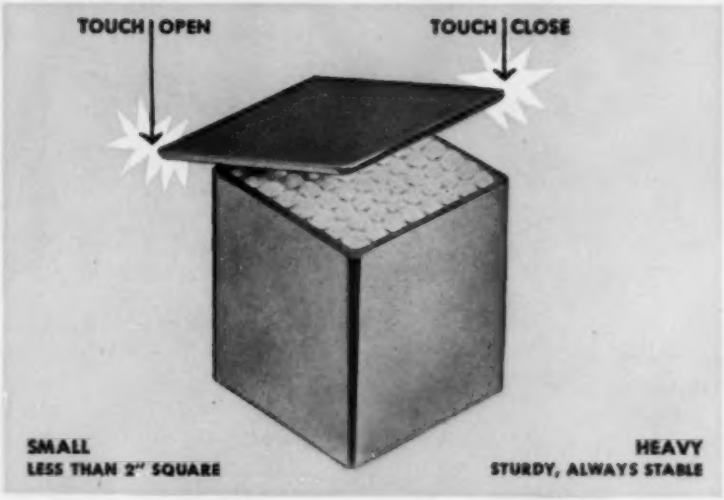

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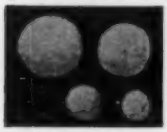

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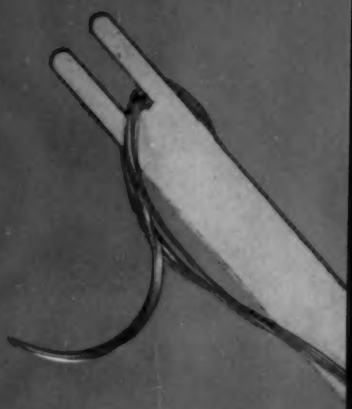

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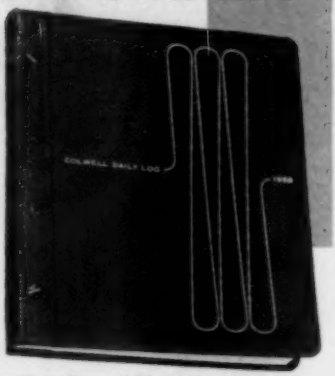

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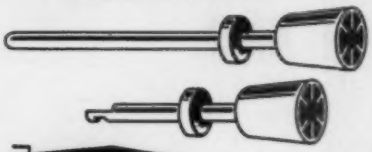

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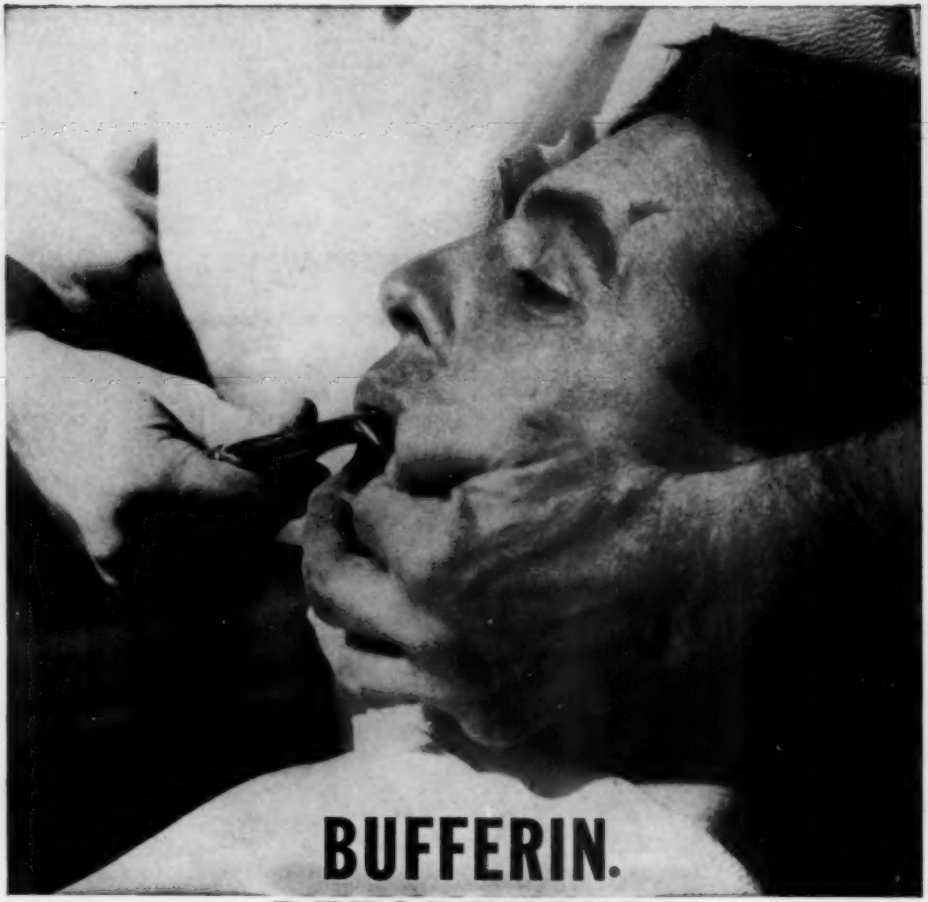

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